EVALUATING THE ECONOMIC BENEFITS OF ENVIRONMENTAL IMPROVEMENTS IN GÖCEK BAY USING CHOICE EXPERIMENT METHOD

A THESIS SUBMITTED TO
THE GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES
OF
MIDDLE EAST TECHNICAL UNIVERSITY

BY

ÖZGE CAN

IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR
THE DEGREE OF MASTER OF SCIENCE
IN
ENVIRONMENTAL ENGINEERING

FEBRUARY 2012

Approval of the thesis:

EVALUATING THE ECONOMIC BENEFITS OF ENVIRONMENTAL IMPROVEMENTS IN GÖCEK BAY USING CHOICE EXPERIMENT METHOD

submitted by **ÖZGE CAN** in the partial fulfillment of the requirements for the degree of **Master of Science in Environmental Engineering Department, Middle East Technical University** by**,**

Prof. Dr. Canan ÖZGEN _____
Dean, Graduate School of **Natural and Applied Sciences**

Prof. Dr. Göksel N. DEMİRER _____
Head of Department, **Environmental Engineering**

Assist. Prof. Dr. Emre ALP _____
Supervisor, **Environmental Engineering Dept., METU**

Examining Committee Members:

Assoc. Prof. Dr. Ayşegül AKSOY _____
Environmental Engineering Department, METU

Assist. Prof. Dr. Emre ALP _____
Environmental Engineering Department, METU

Prof. Dr. Ahmet Cevdet YALÇINER _____
Civil Engineering Department, METU

Assoc. Prof. Dr. Selim SANİN _____
Environmental Engineering Department, Hacettepe University

Dr. Haluk ÇERİBAŞI _____
ENCON Environmental Consultancy Co.

Date: 09.02.2012

I hereby declare that all the information in this document has been obtained and presented in accordance with academic rules and ethical conduct. I also declare that, as required by these rules and conduct, I have fully cited and referenced all materials and results that are not original to this work.

Name, Last Name : Özge CAN

Signature :

ABSTRACT

EVALUATING THE ECONOMIC BENEFITS OF ENVIRONMENTAL IMPROVEMENTS IN GÖCEK BAY USING CHOICE EXPERIMENT METHOD

CAN, Özge

M.Sc., Department of Environmental Engineering

Supervisor: Assist. Prof. Dr. Emre Alp

February 2012, 119 pages

Being one of the specially protected areas declared by General Directorate of Natural Assets Protection, Göcek Bay is threatened by increasing boat tourism and insufficient legal practices. Large scale measures are being planned for decreasing the pollution and protecting the region. For a sustainable coastal management, technical, social, political and economic tools are needed to be used. For environmental investments, it is necessary that they should be identified in monetary terms. The aim of this study is to determine the benefits and costs of the management alternatives to improve environmental quality in Göcek Bay to aid decision makers. In the study, the environmental benefits that can be obtained with improved water quality and restated marine ecosystem was calculated using the Choice Experiment Method. Data analyses are made using Multinomial Logit analysis. The results showed that, for improvements in water quality local residents are willing to pay 18 TL/month and tourists are willing to pay 16.6 TL/tour. For improvements in marine life local residents are willing to pay 14.8 TL/month and tourists are willing to pay 11.2 TL/tour. The total value that can be obtained from these stakeholders is calculated as 751,140 TL/year. This amount enables the investments to amortize themselves in 21 years. With this study, it has been seen that the obtained results will pave the way for new policies and measures against the deterioration of the marine environment of Göcek.

Keywords: Coastal management, environmental valuation, non-market valuation, stated choice experiment, Göcek Bay

ÖZ

GÖCEK KÖRFEZİ'NDEKİ ÇEVRESEL İYİLEŞTİRMELERİN EKONOMİK FAYDALARININ TERCİH DENEYİ YÖNTEMİ İLE BELİRLENMESİ

CAN, Özge
Yüksek Lisans, Çevre Mühendisliği Bölümü
Tez Yöneticisi: Yrd. Doç. Emre Alp

Şubat 2012, 119 sayfa

Tabiat Varlıklarını Koruma Genel Müdürlüğü tarafından belirlenen özel koruma alanlarından da biri olan Göcek Körfezi, artan deniz turizmi ve yetersiz kalan yasal uygulamalardan dolayı tehdit altındadır. Kirliliği azaltmak ve bölgeyi korumak için geniş çaplı önlemler planlanmaktadır. Sürdürülebilir bir kıyı yönetimi için teknik, sosyal, politik ve ekonomik araçların kullanılması gerekmektedir. Çevresel yatırımlar için, bu yatırımların parasal olarak tanımlanması gerekmektedir. Bu çalışmanın amacı karar mekanizmalarına yol göstermek için, Göcek körfezinin çevresel kalitesinin iyileştirilmesinde kullanılacak yönetim seçeneklerinin fayda ve malieyetlerinin belirlenmesidir. Bu çalışmada, iyileştirilmiş su kalitesi ve yeniden belirlenmiş denizel ekosistem ile elde edilebilecek çevresel faydalar Tercih Deneyi Yöntemi ile belirlenmiştir. Veri analizi Çok Terimli Logit analizi ile yapılmıştır. Sonuçlar su kalitesindeki iyileştirmeler için yerel halkın ayda 18 TL, turistlerin ise tur başına 16.6 TL ödemeye istekli olduğunu göstermiştir. Deniz yaşamındaki iyileştirmeler için yerel halk ayda 14.8/TL tursitler ise tur başına 11.2 TL ödemeye isteklidir. Bu paydaşlardan elde edilebilecek değer 751,140 TL/yıl olarak hesaplanmıştır. Bu miktar, yatırımların kendilerini 21 yıl içerisinde amorti etmelerine olanak sağlamaktadır. Bu çalışma ile elde edilen sonuçların yeni yasalara ve Göcek'in bozulan denizel çevresi için alınacak önlemler için yol açacağı görülmüştür.

Anahtar Kelimeler: Kıyı yönetimi, Çevresel değerlendirme, Pazar dışı değerlendirme , Tercih deneyi, Göcek Körfezi

To my beloved parents…

ACKNOWLEDGEMENTS

I would like to express my gratitude to my supervisor Assist. Prof. Dr. Emre Alp for his guidance and criticism throughout my studies. With his support I was able to take big steps for my future career, for which I am very thankful.

I would like to thank to Prof. Dr. Ahmet Cevdet Yalçıner for all his support and for the valuable discussions in many areas of this study.

I acknowledge the contribution of committee members Assoc. Prof. Dr. Ayşegül Aksoy, Assoc. Prof. Dr. Selim Sanin and Dr. Haluk Çeribaşı.

I am grateful to Prof. Dr. Nick Hanley and Dervla Brennan from University of Stirling for their help. Without them, this study would not been able to go on as it did.

I want to thank sincerely to my best friend Yağmur Derin for her friendship, for her spiritual and technical support from the beginning till the end of this study. Her presence was a big help in all parts of my work.

I would also like to thank to Sercan Ceyhan, Emre Hepgüneş, Ayşe Korkmaz, Demet Gülçiçek and Tuğba Türkoğlu for their help during the conduction of surveys in Göcek.

I thank to my roommates Hande Bozkurt, Güray Doğan and Okan Tarık Komesli for all the good times spent together and for their support during my studies. I am also thankful for the friendship and support of Selen Atiker, Merve Böğürcü and Firdes Yenilmez. They made hard times easier with their presence and their comments.

My special thanks go to Jens Trautmann, who was always there when I needed and his great support made me go on when I was down.

Last but not the least, my biggest thanks is to my mother Gül Bergehan Can and to my father Serdal Can. Without their support this study would have not been realized. Even though we could not be together all the time, my brother Emre Can and my grandmother Neziha Can was always there for me for which I am thankful.

This study is funded by the project titled "Monitoring by Remote Sensing and Investigation on Yacht Carrying Capacity in the Marine Protected Areas"(Project code: BAP-07-02-2009-05)

TABLE OF CONTENTS

APPENDICES

LIST OF TABLES

TABLES

LIST OF FIGURES

FIGURES

CHAPTER I

INTRODUCTION

Water resources protection is one of the main environmental goals in recent years. With the increasing demand in water use, a rapid decrease in the amount and quality of the water bodies is brought about. Pollution, in varying degrees, follows these problems. The high pressure arising from the use and the demand of good quality water, created a need for an applicable water policy throughout Europe. The Water Framework Directive (WFD) (2000/60/EC) aims a sustainable water resource management as well as the management of the aquatic and terrestrial ecosystems. This directive presents guidelines for this aim and serves the purpose of achieving and maintaining good quality water together with reducing and eliminating the ongoing pollution problems. There are many policies regarding the water environment but WFD is an important directive which many research projects are stemming from.

Problems of water use and pollution affect the whole surrounding environment in various ways. For this reason, necessary measures need to be taken to improve the environmental quality and while doing so; economic benefits are considered along with the options to protect the environment.

The aim of the study is to define the economic benefits resulting from the environmental improvements in Göcek with the choice experiment method, a non-market valuation technique. With this method, monetary valuation of environmental amenities is identified and they are expressed as necessary payments that are needed to be done by stakeholders of Göcek. These payment values are presented to aid decision makers. They can make use of the calculated amounts during creation of policies regarding environmental and economic cases.

1.1. Coastal Management

Protecting environmental resources are one of the main concerns of the countries in the last decades, since we are experiencing a high increase of population and its subsequent effects on natural resource use. As can be expected, these effects are usually deteriorating the environment and cause instability in the ecosystem. The decreasing environmental quality is mostly and more easily seen in the marine areas in coastal regions. Considering the importance of coastal regions in nations' growth, it would not be wrong to say that they are gaining importance day by day. Marine environment and coasts have a big role in the economy that they belong to, since they provide the nations with fishing, tourism, transport, trade and industrial activities. Seas and oceans used to be one of the most resilient areas, but with the changing ways of living, these environments are threatened with pollution and instability in the services they provide. They are especially vulnerable where the activities mentioned above are intensely going on. It is for these reasons that finding ways for sustainable growth of these areas are gaining attention. The term used for this purpose is Integrated Coastal Zone Management (ICZM).

Coastal management is a highly interdisciplinary issue hence it is used with the word integrated. It requires several disciplines and several stakeholders to work together. Academic and professional institutions each would require specific skills to be able run the related research and they should be working in coherence for accuracy in creating management strategies. (Reis and Lowe, 2012) What integrated coastal management basically focuses on is, while working together with nature, it seeks ways to minimize the effects of the problems on coastal lines created by the users. ICZM tries to achieve this by using reliable data and information and it is stated that ICZM is not just an environmental policy but a holistic approach to planning and management of coasts (European Commission, 2001). Several international agreements and directives are trying to protect the coastal environmental values by implementing action programs and monitoring to help in achieving sustainable standards.(Barcelona Convention, 1976; Marpol; 1973/1978; Water Framework Directive, 2000; EU ICZM Recommendation, 2002) But the actual move towards the term integrated coastal management has its roots in the 1992 Rio Convention.

As in many of environmental protection and improvement cases, ICZM requires creation and use of policies where the existing ones are insufficient. But this is not always an easy task, because even within one nation, there can be conflicting views due to socio-economic factors or differences in cultural perceptions. To overcome this, policy makers should take it into account and be aware that implementation of policies in local, national or international levels might differ greatly. (O'Hagan and Ballinger, 2010) ICZM also requires being a dynamic system and not acting as a one-time solution. The nature itself is changing and this change goes on in ever increasing rate with the overuse of natural resources.

The importance of coastal regions comes from the services it provides and how much people use these services. Issue number 47/2009 prepared by European Commission shows that nearly half of the population of EU countries with a sea border is located in coastal regions. To give numbers Issue number 38/2010 states that, In European Union, in 2007, 43% of the population of the EU-cities having sea-borders was living in the coastal regions and 91% of the residents of these coastal regions live within 50 km from the coast (European Commission, 2010). Management is also important for the security and continuity of maritime activities. For this, European Commission has directed the attention of the related parties towards three main topics: surveillance for marine space security, maritime spatial planning and having a source for reliable and accessible information and data flow. As mentioned, a sustainable and comprehensive management plan can be achieved only when a holistic perspective is achieved. Therefore Researchers have been studying on several projects for ICZM, on different topics such as water quality (Jones et al., 2008; Kontogianni, 2003), tourism (Gu and Wong, 2007; Edwards, 2009), architecture (Falaleeva et al., 2011) and aquatic life (David et al., 2010). This holistic approach makes use of several tools. As can be seen in Figure 1 European Environment Agency advises that environmental, economic and social aspects should be used together for a sustainable outcome. (EEA, 2006) It is usually emphasized that, this dynamic management system, is actually based on experience and many years of studies done before. The improvement of this system thus, relies on this aspect. So, scientific analysis and experiments are the main tools to build up a strong background for the following years.

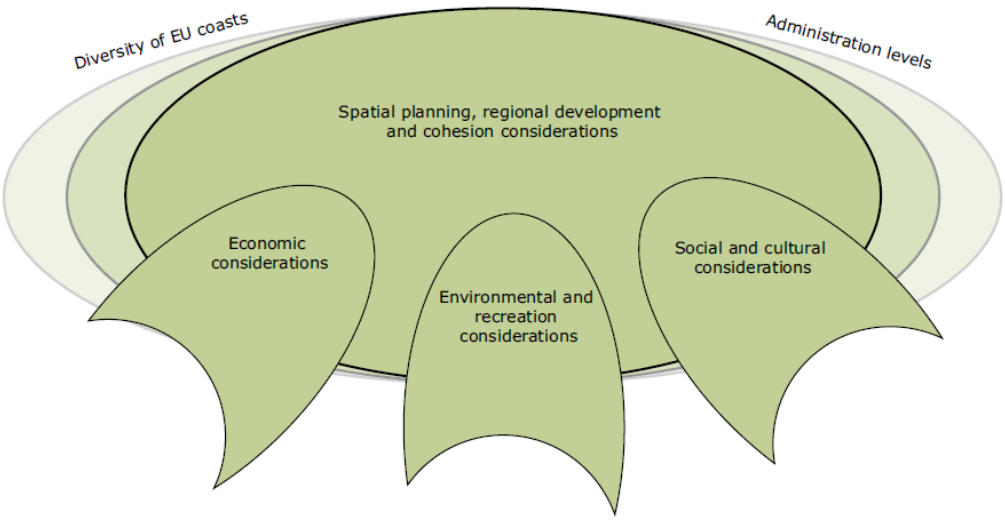


Figure 1. ICZM: the sea/land interface in a sustainable development perspective (EEA, 2006)

1.2. Mediterranean Coastal management

There are many regions being examined for ICZM but one of the highly researched regions is the Mediterranean, which also covers the area which has also been studied in this thesis. "The protocol on integrated coastal zone management in the Mediterranean" by UNEP/MAP in 2008, is the main protocol affecting the implementation of the management strategies in this area. According to this protocol coastal zone is defined as *"the geomorphologic area either side of the seashore in which the interaction between the marine and land parts occurs in the form of complex ecological and resource system made up of biotic and abiotic components coexisting and interacting with human communities and relevant socio-economic activities."*

Importance of Mediterranean can be evaluated in several aspects, but here main related parts will be presented (UNEP/MAP-Plan Bleu, 2009).

The Mediterranean coastline is approximately 46.000 km long, with nearly 19.000 km of island coastline. 46% of this coastline is sedimentary and important and fragile ecosystems such as beaches, dunes, reefs, lagoons, swamps, estuaries and deltas are present there. It hosts 7-8 % of the known marine species in it is small coverage area of 0.8% of earth's ocean area and of these amounts; more than 16% are endangered species. In the region, 60% of

the flora and 30% of the endemic fauna lives. Several precautions are taken with directives to help in saving the Posidonia beds, a type of the sea grasses, against activities such as not using in appropriate fishing gear or not discharging sufficiently treated wastewater.

Mediterranean region is also known with the tourism activities taking place. So, as well as the natural degradations, human affect is seen clearly in the coastlines. The residential attractiveness of the coasts constitutes another problem, when the high urbanization rate in the last decades is considered. It is known and experienced for long that an attractive coastal line is preferred, depending on the costs, as residential areas and hotels (Jim and Chen, 2009; Gopalakrishnan, 2011; Fleischer, 2012). To get to these places, several transportation methods are used and sometimes these methods are the tourism itself, like in the case of yachting. These settlements and transportation vehicles are affecting the coast lines with the pollution and population loads. The maritime transportation used in tourism and also for trade needs to be regulated and for this reason, Mediterranean countries ratified several international agreements to protect the coast lines, most important of them being the MARPOL agreement, International Convention for the Prevention of Pollution from Ships. Of course tourism sector provides a job market as well, which is around 6% in Turkey that goes up to more than 25% for Malta and Lebanon. As a conclusion, importance of tourism in Mediterranean region can be easily seen.

The coastal marine pollution in the south and east Mediterranean countries is mainly caused by inefficient wastewater treatment and industrial production management (UNEP/MAP-Plan Bleu, 2009). There are several countries and cities that still do not have a wastewater treatment plant. Countries in the north of Mediterranean have more regulated systems thus the pollution problems there can be handled more effectively. Main sectors to cause pollution have been identified as, households, transport, energy, industry and agriculture. The main sources of waste input to the marine waters are presented in Figure 2.

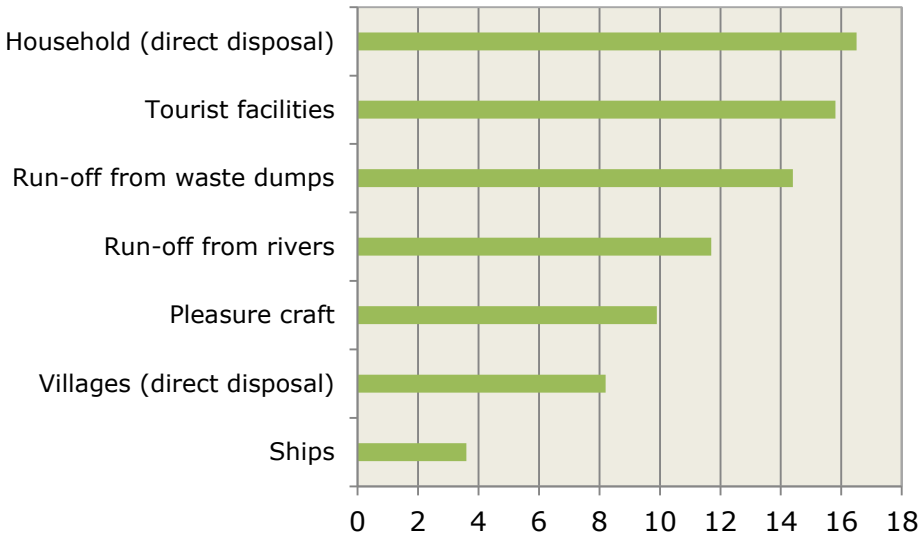


Figure 2. Main sources of marine litters in the Mediterranean (UNEP/MAP-Plan Bleu, 2009)

The values and the current state of the region called for actions and while authorities try to implement old legislations and agreements, it is seen that these are not enough or strong. The necessity of having profound data and information for creation of new policies has lead researchers to focus on integrated coastal management in general and specifically on the Mediterranean area.(Michalena et al., 2009; González-Riancho et al., 2009; Koutrakis et al., 2011)

This thesis consists of a sustainable coastal management related case study in Mediterranean as well. The findings from the study may serve as information related to ICZM projects in the future.

The thesis is structured as follows: Chapter 2 explains the details of Non-Market valuation, its types and its application. In Chapter 3, application of the choice experiment in Göcek is explained along with the design of the experiment surveys. Chapter 4 reports the results of the data analysis and Chapter 5 concludes the study.

CHAPTER II

NON-MARKET VALUATION

From a very basic economic point of view, it can be said that consumers make decisions in a way that they will increase their benefits. Payments made by the consumers are the core of the valuation analysis and these payments can change from case to case. The monetary change in the responses to a given situation or a given good can be reflected with economic valuation techniques (Nunes and Blaeij, 2005). Combining the two points, to be able to see the financial outcome, a valuation has to be made to analyze how the individuals react. When economy is considered, the *goods* are the units to start the analysis. The goods can be thought of things that people value and that can be bought in a market. Examples can be given as a car, a light bulb, a pencil, etc... But there are also environmental goods, which we cannot value directly in a market condition. Examples of environmental goods can be biodiversity, forests, clean water, etc. (Thurston et al., 2009).

Estimating the value for any given good makes the decision making processes easier. But in the case of environmental goods, it is not always as easily calculated as in market goods. So, several techniques for environmental valuation have been developed, including and combining ideas from economic valuation procedures. To be able to understand these fully, a closer look to the types of environmental valuation methods would be beneficial.

2.1. Environmental Valuation

First of all, the reasons behind the need of environmental valuation should be identified. Environmental valuation helps to measure the changes in a welfare increase or loss in the environment. The reasons of these measurements can be a creation of a new policy, land-use planning or damage assessment as well as many others (Grafton et al., 2004).

Most of the consumer goods can be traded in the market but when cases like environmental services or goods are considered, it is seen that non-market valuation procedures would be needed. In this study, since we are dealing with water bodies and other environmental amenities, the focal area can be classified as to be a non-market good/service.

Benefits of the services provided by the ecosystem elements are not easily transformed into economic indicators in policy making, because these services are among the non-market goods (Remoundou et.al, 2009). Since they are non-marketed, they are often overlooked and this leads to further degradation of the resources. (Koundouri P., 2009). So, their contribution to human welfare should be considered and this could be investigated by applying economic valuation methods. Even if environmental goods have low financial values, their economic value can be significant.

It is usually difficult to assign financial values to environmental goods, which in turn creates a need for a good understanding of environmental valuation and its techniques. Total economic value (TEV), the sum of all economic values resulting from environmental resources, is the main parameter. TEV is classified into two categories (Thurston et al., 2009):

1. **Use Value:** Value derived from the use of an environmental good

    a. *Direct Use:* Includes goods that are enjoyed directly (mostly open-access goods), e.g. catching a fish from a stream and eating it
    b. *Indirect Use:* Examples may include *f*orests acting as carbon sinks or wetlands providing water filtration

2. **Non-use Value:** Value derived from an environmental good even if the individual does not use it

    a. *Existence Value:* Individual knows that a good exists, and it provides some kind of welfare
    b. *Bequest Value:* Individual values and preserves the good for the future generations even its value cannot be seen today

Incorporation of TEV to studies is achieved by using market or non-market valuation techniques. In environmental studies, only non-market valuation techniques can result in meaningful results. A summary of the components and examples of TEV in an environmental context can be found in Table 1 (Birol et al.,2006).

Table 1. Components of Total Economic Value for Environmental Resources

TEV Component
Direct Use Values
Irrigation for agriculture
Domestic and industrial water supply
Energy resources (hydro-electric, fuelwood, peat)
Transport and navigation
Recreation/amenity
Wildlife harvesting
Indirect Use Values
Nutrient retention
Pollution abatement
Flood control and protection
Storm protection
External eco-system support
Micro-climatic stabilization
Reduced global warming
Shoreline stabilization
Soil erosion control
Option values
Potential future uses of direct and indirect uses
Future value of information of biodiversity
Non-use values
Biodiversity
Cultural Heritage
Bequest, existence and altruistic values

In order to create a feasible management policy, an integrated approach is needed. If the net social benefits are maximized, meaning the balance is set between the benefits and costs, economic efficiency could be reached. (Birol et al., 2006) To be able to create an environmental policy in an efficient way, the

value of the resources should be known as accurately as possible. As a key step to do this, the stakeholders must be identified correctly and their preferences should be taken into account. (Wattage, et al., 2005) To assess those values, there are several methods available, which are explained in the next section.

2.2. Environmental Valuation Methods

Most used economic methods for valuation purposes are mainly divided into two: Revealed Preferences and Stated Preferences methods. In both of the methods the economic values can be estimated by evaluating people's willingness to pay (WTP) or willingness to accept (WTA) amounts for a given situation, or by calculating the economic benefits or surpluses.

A respondent's willingness to pay shows his/her preference for the good in question. People decide on their WTP considering their funds, their attitude towards the given situation or their socio-cultural characteristics (Stahl et al., 2007). There are cases that people are offered with a choice of a compensation value for a loss in the welfare in the environment and this is measured by their willingness to accept. The difference between WTP and WTA lies in the way that the valuation questions are asked, one seeks an answer of how much the respondent would pay whereas the other type of questions seeks an answer for how much the respondent would agree on, as a compensation for a loss.

2.2.1. Revealed Preferences Methods

These methods are indirect valuation methods that gets the results by examining the consumers WTPs (or the consumers/producers surpluses) from an indicator market, by trading and applying the information received. Here, two most commonly used revealed preference methods will be explained.

2.2.1.1. Travel cost method (TCM)

This method relies on the information of how much time and travel expenses people allocate for using a recreational site. By looking at how much money is spent, the WTP can then be estimated. If a change occurs in the examined ecosystem, this is reflected in the expenditures and travels, showing an increase or a decrease in peoples' WTP. The main drawback of this method is that it can only evaluate use-values of the environmental resources. (Birol et al., 2006)

Soderqvist et al. (2005), made a TCM study in the Swedish Archipelago for understanding the recreational fishing habits there and the needed support to increase the amount of fish-catching. They have used the data of the sites visited, the travel times, distance and costs and rates of catch. As one of their WTP outcome, for a catch of 1,6 kg instead of 0,8 kg, respondents' WTP was calculated as 56 Swedish Kronor.

In a study in 2010 by Vesterinen et al., TCM was the chosen method to analyze the benefits that would result from the improvements in water quality that is suggested in the Water Framework Directive (WFD). Since in this study swimming, fishing and boating are found out to be the highest recreational water activities in Finland, the water quality indicator was chosen to be water clarity. Available recreational inventory data has been used in the study to evaluate the effects of improvements in the water clarity. The lowest per-trip benefits of visit to a water recreation area are found to be ranging from 6.30 – 8.30 euros per person.

An example from Turkey can be given from the study of Gürlük and Rehber (2008). Kuşcenneti National Park and Lake Manyas was the study area, which is one of the twelve Ramsar sites in Turkey, decided after the Ramsar Convention on Wetlands Treaty. The travel cost method was applied with face-to-face interviews. Total annual consumer surplus from the recreational visits to the site has been estimated to be around 103 million US Dollars and the authors stated that this finding can help in the management of the national park. This amount was found to be higher than the annual investments and operational cost of the lake, suggesting that with the new investments and improvements for the lake the social benefits would be significant.

2.2.1.2. Hedonic pricing method

Rosen (1974) developed the hedonic pricing model, which he basically explains the idea behind as: hedonic prices are implicit prices of several attributes that can be reflected in the prices of different products that are also affected by the product's characteristics.

This method usually uses house prices to examine the value of environmental resources. If the individuals prefer to reside near a good environment, e.g. having a good air/water quality, flood control measures, etc., the theory suggests that this, in turn, will affect the prices of the houses. So by again an indirect measurement, the valuation is made. With this method, only direct-use values are measured.

Examples of this method in environmental valuation are numerous. Hamilton's (2007) focus was on the effects of climate change on tourism. He analyzed this by considering the possible sea-level increase and its effect on Schleswig-Holstein state in Germany. Since this state is flood prone and also it has a large tourist load in Germany because of its coasts, it was chosen to be the study area. The effect of heightening the existing dikes or building new ones to be protected from the floods is evaluated using the hedonic pricing method. Hotels, Bed & Breakfasts and private accommodations are chosen and the pricing data for one night stay is used. As one of the outcomes in the study, for a selected location, conversion of 1km open coast to a 1 km dike would create a loss of around 825 thousand Euros per year.

The importance of open space access and the view quality of those spaces from the residential homes have been examined in Sander and Polasky's study (2009). The study area was Ramsey County, Minneapolis, USA. Real estate data sets are obtained and used for the analysis. Calculations such as distances to open space or finding the locations of parks have been made using GIS. The hedonic price model showed that if a house's viewshed is increased from 100 m^2 to 1000 m^2 the price of the house is increased 386$. The components of the view, such as it being grassy or with water, increases the price in the range of around 5000$ - 7400$. The study also showed that people value living close to a lake more than living close to a stream. The marginal price of a house's

proximity to a park increased 136$ more, when the distance is reduced to 100m from 1000m. This study helps in urban development managers, or land-use planners in the policy making stage, by putting forth the values of several environmental amenities.

Waltert and Schläpfer's 2010 review looks at the relation between landscape amenities and local developments. They have evaluated 53 hedonic pricing studies and found out that nature reserves and the diversity of the land cover are the main amenities that increase the prices of the residential properties, followed by open space and existence of forests as the other important amenities.

2.2.2. Stated preference methods

This method, unlike revealed preferences, is a direct way of valuation. It is nowadays widely used in environmental valuation because it can measure the non-use values as well as the use-values. Since environmental valuation is highly composed of non-traded goods and resources, stated preference methods serve better in the analysis. This method uses a questionnaire/survey technique to estimate the WTP of the respondents. Two of the mostly used methods in this topic, is presented below.

2.2.2.1. Contingent valuation method (CVM)

The CVM method depends on gathering data by survey making and then analyzing these data to find out the WTP. In the surveys, an explanation of the current situation is presented together with a scenario showing the possible changes and outcomes of that situation. People are asked to place a value to that change in the non-marketed good. (Thurston et al., 2009)

Contingent valuation method (CVM) is a popular approach in determining WTP of non-use values. Some examples from the numerous applications in literature can be as follows: Kontogianni et.al. (2003) evaluated the WTP of the citizens in Greece for full operation of wastewater treatment plants; Ojeda et.al. (2008)

examined the WTP values for restoring instream flows in the Yacqui River Delta, Mexico; Lee and Mjelde(2007) looked into the valuation of the ecotourism in a demilitarized zone in Korea.

A detailed example of a CVM study can be given from a Turkish case (Adaman et al. 2011). The aim of the study was to find an amount for the WTP for the reduction of CO_2 emissions in Turkey. The survey was conducted in 26 cities, with a face-to-face interview method and around 2400 households participated. The critical part of the survey, that is the valuation part, is presented to the respondents by first making the current situation clear. After telling about the adverse effects of corbondioxide emissions and Turkey's place in this, they are asked about their willingness to pay amounts for a scenario that Turkey would take part in projects that will reduce the emissions.

In contingent valuation, determination of the price amount is usually made by bidding games. For example, if a respondent says yes to the first offered amount, the interviewer may increase the amount by asking him a second time; or if the respondent says no to an offered amount, this amount can be reduced in the second time. The aim of this is to find the maximum willingness to pay amounts of the respondents.

Even though CVM has been used quite commonly in environmental valuation studies, an advanced version of this method gained its place, which is the Stated Choice Method (SCM) (also known as Choice Experiment). Since CVM is the descendant of stated choice method (SCM) which is used in this study, detailed descriptions and comparisons of the methods is presented in the next section.

2.2.2.2. Choice Experiment Method (CE)

This method, as stated before, has the same background as CVM. It also needs surveys to be done to be able to estimate the WTP. The main difference between the two methods is that, in Choice Experiment Method the respondents choose between several options of a scenario, not only one case as in CVM. Contingent valuation analyses the situation in a more holistic way usually with

one or two alternatives whereas choice experiments includes more than two scenarios and alternatives and include a cost price for determining the willingness to pay (Brouwer, 2008). Both of the methods require a hard work in data collection and analysis, but the advances in the survey methods makes choice experiments more preferable over CVM. In this study, Choice Experiment method is chosen for the estimation of WTP and detailed information will be given in the coming section as how to apply this method to the studied case.

2.3. Choice Experiments

As mentioned in the previous sections, choice experiments emerged as a new method in determining the values of a given non-market good or environmental service. First component of TEV, use-values are included in the analysis by looking at the users' choices and how they use the environment. The second component of TEV, non-use values are included throughout the surveys and these values affect the respondent's decisions, e.g. if the respondent values the suggested alternative for future generation or only for his own satisfaction.

The choice experiment technique is based on the random utility theory, where choices are made among different attributes. When one of these attributes is defined as price or cost, the marginal utility estimates can then be used to estimate willingness to pay amounts for the changes in the attributes. (Hanley et al, 2005)

This method is usually used to assess willingness-to-pay of the respondents but it can also be used in estimating the willingness-to-accept (WTA) as well. There are cases that the CE is used for only choosing an option, rather than finding out the economic value as in the study of Wattage et.al. (2005) in United Kingdom, where they have analyzed the stakeholders' responses for choosing the objectives in the fisheries management.

In WTP estimation studies, individuals are asked how much they would pay to support the change for a given option. Depending on the calculated overall WTP, the policy or the project makers can give decisions more efficiently. They can know in what way the project will be affected depending on how, when or where

they make the change. In WTA; however, people are offered different amounts of payments and asked how much would be enough for them to compensate the change in a given scenario. To reflect the effect of the change on the environmental quality or quantity, minimum willingness-to-accept or maximum willingness-to-pay is aimed. Usually, only WTP or WTA is chosen for the analysis. There are studies investigating their relation. In the study of Del Saz-Salazar et al, a comparison is made between willingness to pay versus willingness to accept by CVM in the case of river Serpis, Spain. This study is important since they analyzed the difference in the context of Water Framework Directive.

The structure of CE method starts with a detailed information gathering about the current situation. Target population and what type of sample population is going to be chosen comes as the next step. Then for preparing the surveys, this information is used to create scenarios with different options. These options can include increase, decrease or no change in the current situation. With carefully prepared scenario options, this method can estimate the values clearly since the respondents would only answer to what is asked, not something that a scenario can imply. A well prepared and comprehensible survey is the key in choice experiments.

After the draft questionnaire preparation is finished then it is tested with focus groups. These groups help the surveyor to see what the missing points, incomprehensible sections and other problems are. After this study, the survey is adjusted and made ready for the main study. This time, the survey is conducted with all individuals of the sample area and data are collected. The analysis of the data is dependent on economic and statistical methods.

2.3.1. Survey Construction

The first step to be thought when preparing the questionnaire for a survey is thar it should include the correct and precise information about the changes. By correctly choosing the attributes and levels of them, valuation process can then be made accurately (Hoyos, 2010). In the presentation of surveys, clear definitions of the current situation and the hypothetical scenarios should be

made available; such as the policy backgrounds of the scenario, special situations in the current case or the time period that the changes will occur. In every step, the cognitive abilities of the respondents have to be considered. (Powe, 2007). This is another reason why stated choice methods are more complex than other methods in economic/environmental valuation.

The selection of the target populations should be made considering factors such as the familiarity of the respondents with the service to be valued or how much the proposed changes will affect the population and where the results will be used (Bateman et al., 2002). Chau and Chung (2010)'s study looks into the effects of previous green experiences on the respondents' on their WTP for green buildings. They have made this study in two districts in Hong Kong, both sharing green and conventional developments inside the districts. This way, the authors could be able to differentiate the views of both the green building residents and conventional building residents. Their responses varied, expectedly, considering whether they have lived in or benefited from a green building.

In another study, the selection reasons for the population can be clearly identified. Harris and Probert (2009) made a study in Swansea University to test the viability of using refillable cups. Their aim was to promote sustainability in the universities so the choice experiment was run in the campus, with the target population being the students and the staff. They have reached to a conclusion that waste minimization by using refillable cups can contribute to sustainability if such a project is started.

The CE surveys, usually are composed of 3 main sections: First, giving background information of the case that is presented and evaluating the respondents' knowledge and attitude towards the situation; then, the presentation of the scenarios, along with asking the respondent's WTP; third, socio-economic information of the respondents. These sections may differ in content or number but the majority of studies show a similar pattern as stated (Kataria, 2009; Del Saz-Salazar et al., 2009)

When WTP amounts are sought, the payment vehicle is the important parameter. Which payment vehicle will be used in the survey should be identified, for making it clear to the respondents when they are presented the

choice alternatives. In environmental valuation, the trade-offs are measured by the payments. There are various payment vehicles used such as, increase in the water bills, one-time payments, local taxation etc. The respondents react different to different types of payment vehicles. This can also be a reason for the protest responses in some cases since the respondents believe polluters should pay, or sometimes they do not think that the money spent will not reach to the needed place. Rolfe et al. (2000) used a voluntary one-time payment to avoid the protest responses in their choice experiment study about tropical forest preservation in Vanuatu. When the payment vehicle is identified taking into account of the social norms and the residents' lifestyles, then a more precise information can be gathered in terms of the WTP. Although the choice of the payment vehicle is case specific, increase in the bills is the most common one. (Thurston et al., 2009; Jones et al., 2008; Kontogianni, 2003)

The conduction of the surveys can be made in various formats: Face to face interviews (Ojeda et al.,2008; Liu and Wirtz, 2010), sending via mail (Atkins et al.,2007; Eggert and Olsson, 2009), telephone surveys (Zoppi, 2007) or internet surveys (Hidrue, 2011). In this study face-to-face technique will be used, due to its advantages over other methods such that;

- It is very flexible, and has more sample control
- Complex questionnaires can be conducted with ease
- Clarification and use of visual/demonstration aids is possible
- Larger data collection is possible
- High response rate is achieved.

The disadvantageous sides of this method are mainly that it is relatively expensive to prepare and conduct, interviewer bias can be present and long questionnaires are usually not feasible since it would be mind-tiring. (Bateman et al., 2002)

Scenario construction is the most detailed part of the surveys. After the gathered information about the current situation (status quo), the problems can be understood. By analyzing the data, by focus group meetings and by consulting professionals and scientists, the problems to be solved and the possible outcomes are identified and then the scenarios and their attributes are

created. (Smyth et.al.,2009; Lee and Yoo, 2009) When the scenarios are made, the status-quo/no cost option should always be included.

How to choose attributes and prepare scenarios:

First of all, it is needed to be known what an attribute is, in the context of these surveys. These surveys put out a choice card for the respondents for them to make selections in the valuation part of the studies. A choice card composes of different number of scenarios. Before deciding on the scenarios, the aim of the survey is considered. For example, in the study of Braulio Carrillo National Park, Hearne and Salinas (2002) deals with tourist preferences for ecotourism. Attributes can be thought of a characteristic, so in this case, the attributes selected for the study were: infrastructure, information, view, use restrictions and price. It can be clearly seen that all these attributes are closely related with a national park. After selecting the attributes, there is a need for different levels so that a comparison can be made by creating scenarios. As an example from this study again, the infrastructure attribute has levels of rustic, semi-rustic or modern.

The level selection can also be in the form of defined values, such as an area of a place, or they can be percentages of a given thing, such as the coverage of forestland in a given location.

After selecting the attributes and levels, we can move to the scenario creation. Scenarios include different levels of the same attributes considered. For example, Rambonilaza and Dachary-Bernard (2007) included absence of hedges in one scenario, whereas in another scenario this levels was changed to slight presence of hedges among with the change in other attributes.

Usually, the last scenario is chosen to be the status-quo option for the respondents to have an opt-out option and also for them the see the difference of the other offered scenarios with respect to status-quo.

Researchers usually want to have numerous attributes in the surveys so that more information can be gathered. But when the amounts of attributes and the levels increase, the respondents might have difficult times answering them by

losing their concentration or interest. (Hanley et al., 2001) Therefore; keeping the attribute number within a manageable frame is desired.

When determining the levels and the attributes, two ways can be chosen: Full (or complete) factorial design or fractional factorial design. In full factorial design, as the name implies, all the attributes and their levels are included. Each level of every attribute is combined with all of the levels of all the other attributes (Louviere et al., 2000). For example, if there are 4 attributes and each attribute has 3 levels, then 3^4= 81 alternatives can be created. Or when there are 4 attributes with 6 levels, and 2 attributes with 3 levels, there would be $6^4 + 3^2 = 1305$ alternatives.

An example to full factorial design could be given from a simple case as shown in Table 2. Consider selecting a vacation location. Let the first attribute to be its distance, and let this attribute have 2 levels, such as closer than 250 km and further then 250 km. and let the other attribute to be its sea water clarity, and levels of it are clear till 2 meters and clear till 6 meters. When we consider these, we can only have 2 x 2 = 4 different scenarios. If we had another attribute with 2 levels, then our selection would be between 2 x 2 x 2 = 8 alternatives.

Table 2. Example Factorial Design

Alternative	Distance	Sea Water Clarity
1	<250 km	2 m
2	>250 km	2 m
3	<250 km	6 m
4	>250 km	6 m

It may not always be as low 2 attributes and 2 levels, there are usually more alternatives coming out from a full factorial design. But since providing respondents with many alternatives is not practical, fractional factorial design is used more. In the fractional factorial method, only the main effects are considered. By doing this, for example 81 alternatives can be brought down to 9 alternatives (Bateman et al., 2002). In this design, orthogonality is the most important parameter. When the alternatives are orthogonal, it means that there

are no correlations between them. Achieving this orthogonality makes the researcher understand which the driving factors among the suggested alternatives are. When the relations between these alternatives are examined, it cannot be possible to identify the effect of a single alternative. When relying on the mechanically created orthogonal designs, care should be given to omit alternatives that do not make sense. Then the survey's credibility is not reduced and the respondents give better answers (Bateman et al., 2002).

By choosing fractional factorial design, some important interactions are being omitted and this, in turn would create doubts about choosing it. But studies show that, for making the surveys applicable, so that they are not long and boring for the respondents, this sacrifice should be made. If the interactions are to be included, then it brings about other questions as which of them to include, i.e. two-way interactions, three-way interactions etc. So the decision is usually left to the researcher since these decisions are case-specific.

When the attribute selections are being made, dominant choices should be omitted. A choice which is better most of the time does not give efficient results, since the respondent would choose that scenario every time he is asked to choose. For example consider a respondent who wants a decrease in the air pollution levels in the place he lives and also he wants to have more bike roads available. If the presented scenario included these attributes in the way he wants, but with a price quite lower than the other scenario which includes only less air pollution and same bike roads amount with an increased price, then it means he will always choose the first scenario, because he would pay less to have more desirable changes. Whereas in the other scenario, he would pay more but he will not get the same benefits that he would in the other case. So this dominant choice option should be avoided to be included as much as possible.

Apart from the times that the attributes are low in number and their domination is easily identifiable, this procedure can be done using statistical programs. Different programs from SAS Institute Inc. have been seen in many studies such as the ones from Han et.al (2008); Wattage et. al (2005) and Wielgus et.al. (2009) Also guides for designing the attributes have been mentioned such as the SPSS ® software.

Construction of choice sets can be deduced from the gathered attributes. They can be used individually, or within groups of alternatives. For example, 4 groups of choices can be made from 12 alternatives, so in each group there will be 3 scenarios with different levels.

When the choice experiment is done for willingness to pay calculations, one of the attributes is always the price. The respondents' answers are controlled by open-ended questions or by close-ended questions. In open-ended version, they are asked how much they would be willing to pay for the suggested case, but in close-ended format, they are presented one or sometimes more than one value so they can choose from a pre-defined set. These values to be used in the scenarios, can be found from the project information gathered such as the household expenditures, average water bills etc. (Ojeda et al.,2008). Lee and Yoo (2009), defined their draft price attributes by first from the literature and consulting to academics and after a focus group study with 30 people, they calculated the lower and upper bounds of their stated WTP amounts. A point to note from their study is they have conducted the survey both on-site and off-site, to be able to see the differences.

An interesting study to analyze the respondents' willingness to pay amount was done by Lee and Mjelde (2007). They defined their price levels from a pre-made open-ended survey. They used a hypothetical setting and a real setting in the payment strategy. In the hypothetical case, the respondents were asked to state their maximum WTP, but in the real case, they are asked to give an organization name so that they will be contacted later on for the payment. The payment vehicle chosen in this study was donations. The interesting part of this study is the differentiation of the respondents' way of thinking by using a real and hypothetical setting. Because some of them refused to give an organization name after the hypothetical setting questions, and this in turn helped the authors to identify and/or reduce the bias.

The presentation of the scenarios in choice experiments is mostly done by choice cards or they are directly included in the survey, depending on the conduction type (Thurston et al., 2009; Zhai and Suziki, 2008). The number of times that each respondent faces with choices is an important parameter to consider, because people can get tired of answering and after some time they

can only answer for finishing the survey and not because they really choose that alternative they say. (Snowball J., 2008)

When designing the scenarios, there are four main choice modeling types (Bateman et al., 2002):

1. Choice Experiments: respondents choose from two or more alternatives versus status quo
2. Contingent Ranking: Presented alternatives are ranked by respondents according to their choice
3. Contingent Rating: The scenarios are given ratings according to a scale (e.g. 1 to 10)
4. Paired Comparisons: The respondents choose from two alternatives by stating their strength in preference of one over the other according to a scale.

After deciding which model is going to be used, choice sets are prepared, usually with the help of statistical packages leaving the sets having any dominance or they are made sure that they represent the situation correctly.

If the constructed alternative sets are too large to handle, they can be separated into blocks or subsets can be created for the alternatives so that for each subset a new design can be made. But when this is done, then the surveys should be more in number to be able to gather more responses, since the choice sets are large and separated into groups (Bateman et al., 2002).

2.3.2. Analysis of Surveys

In qualitative choice studies many responses give an output such as yes/no, or occurrence/non-occurrence. These types of data are better analyzed with logit models rather than ordinary least squares (OLS) regression. The reasons for this are presented in the following sections.

2.3.2.1. Why Logistic Regression instead of OLS?

Since our dependent variable, y, is qualitative we are interested in occurrence/non-occurrence of events or yes/no answers, so we should be looking at probabilities. That is why models for qualitative response regressions are called probability models. (Gujarati D., 2004)

The basic model would be a binary dependent variable case, where the linear probability model is:

$$Y_i = \beta_0 + \beta_1 X_i + \varepsilon_i \quad (1)$$

Where y is the dependent variable, X is the independent variable and ε is the disturbance (error) term. Here i denotes the respondents and βs are the coefficients.

This is actually a classical linear regression model but since now our dependent variable is binary (0 or 1) this is called a Linear Probability Model (LPM). LPM has several problems for use in this case which are:

1. **Disturbance terms do not follow a normal distribution**

Since Y can only take two values, the disturbance terms will also take only two values which make it clear that the ε_i terms do not follow a normal distribution but instead they follow a Bernouilli Distribution.

2. **There is heteroscedasticity in the variance of the disturbance terms.**

For the error term given in (1), the variance for the disturbances is

$$\text{var}(\varepsilon_i) = P_i(1 - P_i) \quad (2)$$

and

$$P_i = E(Y_i \mid X_i) = \beta_1 + \beta_2 X_i \quad (3)$$

From here we can say that the variance of the error term in the LPM is heteroscedastic because; the variance of u_i ultimately depends on the values of X and therefore is not homoscedastic.

For example, when we fit a line with values concentrated on 0 or 1, it is clear that errors that are close to 0 or 1 will be smaller than the ones that are towards the middle of the regression line, which will be relatively high. This creates different variances among the error terms.

3. $E(Y_i|X)$ is not always between 0 and 1

In OLS we are trying to estimate the expected value, $E(Y_i|X)$, and in LPM it measures the conditional probability of Y, given X. Below, in Figure 3, are two graphical represenatitions for releationships of (a) two continous variables and (b) one dummy dependent variable with a continous independent variable. (Pampel F., 2000) When we make a regression for both of them, for (a) it would give meaningful results because the OLS regression will have minimized the squared errors. But in (b) we have only two outcomes (in this case 0 and 1) and when we try to fit a best line to it, it will go above 1, or go below 0. When we think of 0 and 1 as representing the occurrence or non-occurrence of an event, this result will lose its meaning. (The variables can be coded other values rather than 0 and 1, but if we think of them representing the probablities of events, it is easier to make a connection between them.)

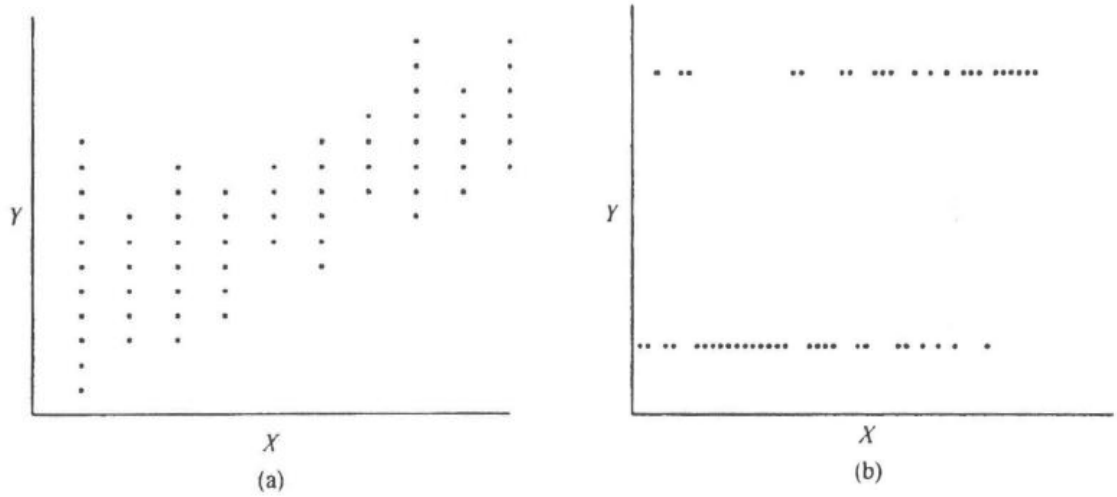


Figure 3. OLS vs Logit models

For example, consider a student who wants to buy a book when he has enough money, say $20. When he has money equal to or more than $20, he will buy the book, and he will not buy it otherwise. So we have two outcomes here. If we have a best line trying to represent this event, some parts of it will be out of 0-1 range and it is not possible that a student will be more than likely to buy a book or vice versa. He will either buy, or not buy. To correct this problem, it should be made sure that the function should have boundries, i.e. values more than 1 will be truncated to 1 and values below 0 will be truncated to 0.

4. **R^2 is not meaningful for goodness of fit.**

When we consider the shape of the regression line, it is clear that R^2 is usually very likely to be lower than 1. It is again beause of the dependent variable takes the value of 1 or 0 and a LPM would not be expected to fit such a scatter well.

Because of the four reasons presented above, the use of LPM would create problems in analyzing qualitative response models. The major drawback with the LPM is that it assumes that probability increases linearly with X, which is not logical in real life cases. Think of a house ownership example where an increase in income increases the likelihood of buying a house. An increase of $10.000 for a person earning $40.000 would increase the likelihood of buying a house more than an increase of $10.000 for a $200.000 income would do for another person. It is highly probable that people having high income would buy the house without that $10.000 increase. But for a person laying in the middle-range income, that increase might shift his condition from not being able to buy to buying the house. (Pampel F., 2000)

The idea is that, the same amount of change in X has less impact on the outcome near the boundary levels of 0 and 1. An increasingly larger change is needed to have the same impact that smaller changes create around the middle of the curve. This signals a non-linear relationship between the variables with the curve being an S-shaped curve, which is given below in Figure 4. This curve is actually a cumulative distribution function of a random variable and logistic (logit and probit) and normal models may be used to represent this curve. But in this study, the focus will be on logit models.

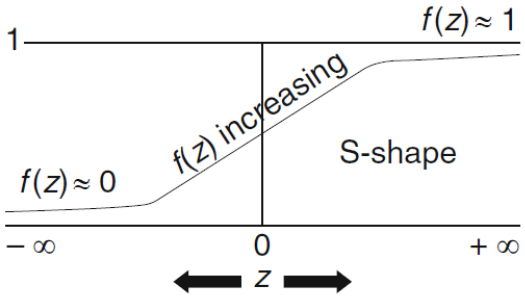


Figure 4. S-shaped Logit Curve

2.3.3. The Logit Model

To arrive to the logit model we should start from odds and odd ratios because as Pampel F. (2000) states *"We need a transformation of the dependent variable to allow for the decreasing effects of X on Y as the predicted Y value approaches the floor or ceiling.* (values of 0 and 1) *We need, in other words, to eliminate the floor and ceiling inherent in probabilities."*

The logit transformation has two steps. The first is to calculate the odds. The odds of an event to occur is

$$O_i = P_i / (1-P_i) \quad (4)$$

where P_i is the probability and O_i is the odds.

When we take the natural logarithm of the terms, we get the log odds, also known as the logit, L_i:

$$L_i = \ln [P_i / (1-P_i)] \quad (5)$$

The odds show the likelihood of an occurrence of an event relative to the non-occurrence of it. Both odds and probability have a lower bound of zero but odds do not have an upper bound. Consider a probability of 0.9 for an event; the odds would then be 0.9/0.1 = 9, and in other cases it can go higher than this. When we want to compare the odds for two groups we need to use odds ratios, which are basically the ratios of the odds for each group.

2.3.3.1. Main Properties of the Logit Model

1. As Probability goes from 0 to 1 the Logit goes from -∞ to +∞.

When we take the log of the odds, the lower and upper boundaries are not present anymore. Because the logs of odds between 0 and 1 give negative values, the odds equal to 1 gives 0 and odds above 1 give positive values. When $P_i = 0$, the logit is undefined because log of odds of 0/1 = 0 but the logit approaches negative infinity when the probability comes closer to zero. When $P_i = 1$, the logit is also undefined because log of odds of 1/0 do not exist but the logit approaches positive infinity when the probability comes closer to one.

2. The Logit transformation is symmetric around the midpoint probability of 0.5 and it has a point of inflection.

When the probability is 0.5 the log odds is 0, since ln(0.5/0.5) = ln1 = 0. We have negative logits when P<0.5 and positive logits when P>0.5.

Similar to the explanations in the above sections, when the probabilities are near the boundaries of 0 and 1, small changes in probabilities create larger differences in logit.

There's a linear relationship between the independent variables and the logit dependent variable, and a non-linear relationship with the probabilities:

$$L_i = \ln [P_i / (1-P_i)] = \beta_0 + \beta_1 X_i \quad (6)$$

To express the probabilities:

$$P_i / (1-P_i) = e^{\beta 0 + \beta 1 Xi} = e^{\beta 0} * e^{\beta 1 Xi} \quad (7)$$

When we solve for P_i,

$$P_i = (e^{\beta 0 + \beta 1 Xi}) / (1 + e^{\beta 0 + \beta 1 Xi}) \quad (8)$$

which then equals to what is known as the logistic distribution function,

$$P_i = (e^{Li})/(1+ e^{Li}) \quad (9)$$

It can be seen from (6) that there's a linear relationship with X_i and L_i, and a non-linear relationship with P_i. Of course, this creates difficulties in the interpretation for the estimates of the logit model.

2.3.3.2. Interpreting Logistic Regression Coefficients

Log odds:

The coefficients obtained in the logistic regression shows the effect of one unit change of the independent variables on the log odds. For example, for a smoking/ non-smoking people model when it is found that a coefficient is -1,3 for the higher education variable, it would mean that the log odds for people to smoke, who are university graduates are 1,3 lower than those who are not university graduates. This interpretation is similar to the OLS regression interpretation, but it does not give meaningful explanations to the analyst.

Odds:

To obtain more meaningful interpretation from the model, the log odds can be transformed into odds by exponentiating the both sides of the equation

$$L = \ln [P / (1-P)] = \beta_0 + \beta_1 X_1 + \beta_2 X_2 \quad (10)$$

$$e^{\ln [P / (1-P)]} = e^{\beta 0 + \beta 1 X1 + \beta 2 X2} \quad (11)$$

$$P / (1-P) = e^{\beta 0} * e^{\beta 1 X1} * e^{\beta 2 X2} \quad (12)$$

The important point here is that the last equation is multiplicative rather than additive and this effects the interpretation. A coefficient of 1 would make no

effect while a coefficient greater than 1 would increase the odds or lower than 1 would decrease the odds.

The formula below may be used to obtain the percent change of the exponentiated coefficient on the odds

$$\Delta\% = (e^{\beta} - 1)*100 \quad (13)$$

Say if the exponentiated coefficient for daily hours of study is estimated to be 1,28, then we can say that the odds that a student passes the test is 28% more for an increase of 1 hour of study.

Probabilities:

When we want to compute the probabilities rather than odds or log odds we can use the estimation values and calculate the probabilities for a chosen value of X by using the below equation.

$$L_i = \ln [P_i / (1-P_i)] \quad (14)$$

2.3.4. Random Utility Theory

In choice experiment surveys, participants are asked to choose scenarios out of the presented alternatives, with each scenario comprising of different attributes and levels. These choices and their analysis depend on the Random Utility Theory and consumer choice theory. The latter theory states that consumers derive satisfaction from the attributes of the goods, not only from the goods themselves (Lancaster, 1966). For the modeling of the CEs, random utility theory (McFadden, 1974) is used as the principle theory. It briefly states that, respondents would choose one alternative over another when the utility that the chosen alternative provides is higher and that this choice is composed of two components: deterministic (or systematic) term and the error term. The error component serves the purpose of containing the uncertainty of the predictions.

The utility of a choice can be represented mathematically as follows:

$$U_{ij} = V_{ij}\,(X_{ij}, S_i) + \varepsilon_{ij} \quad (15)$$

Here, U_{ij} denotes the utility that the *i* th respondent will obtain from choosing alternative *j*; V_{ij} is the systematic term which is a function of X_{ij}, the vector that includes the attributes, and the respondent's characteristics S_i. The random error component is denoted by ε_{ij}. Error term helps to include the effects of the omitted variables and the case specific factors that affect the utility; thus helping the researcher not to miss the effects of the unobservable factors. (Longo et.al., 2008)

A respondent would choose alternative k over alternative j only when the satisfaction obtained from choosing that alternative exceeds the other; $U_{ik} > U_{ij}$, where *U* denotes utility. So, the probability of the *i* th respondent choosing the *k* th alternative over *j*, from the choice set *C* is given as (Hanley et.al., 2006):

$$P_{ik} = \text{Prob}\,(U_{ik} > U_{ij}.)\ \text{, for all } j \text{ in } C,\ j \neq k \quad (16)$$

$$P_{ik} = \text{Prob}\,(V_{ik} + \varepsilon_{ik} > V_{ij} + \varepsilon_{ij}),\ \text{for all } j \text{ in } C,\ j \neq k \quad (17)$$

For the *j*th alternative, when we look at the meaning of V_j, it is referred to as "representative component of utility" and it includes the observed and measured attributes for the individuals. Each attribute's marginal utility can be explained by different weights associated with them. This can be shown with the following equation:

$$V_j = \beta_{0j} + \beta_{1j}\, f(X_{1j}) + \beta_{2j}\, f(X_{2j}) + \ldots + \beta_{Kj}\, f(X_{Kj}) \quad (18)$$

Where β_0 is the alternative specific constant (ASC) that shows the unobserved sources of the utility and it is not related to any of the observed or measured attributes. β_{1j} is the coefficient (weight) of attribute X_1 and alternative j. Here, attributes are included as functional forms because depending on the model, they can be included in forms such as logarithmic, quadratic or in combinations (interactions). If the attributes are to be handled as linear, they can directly be written as *X*s. (Hensher et al., 2005)

For calculating the selection probabilities of a choice model, the property of Independence from Irrelevant Alternatives (IIA) is adopted. It states that,

considering all alternatives having a non-zero probability of choice, presence or absence of an additional alterative does not affect the ratio of the probabilities of choosing one alternative over another. (Louviere et al., 2000) IIA can be exemplified with the following case. Consider there are two alternatives presented to the respondent for a transport choice experiment. The probability of choosing a car is 0.5 and the probability of choosing the other alternative, train, is also 0.5. So the odds ratio is 1:1 in this case. IIA assumption states that this ratio should not change when a new alternative is introduced or taken out. An example of the violation of IIA is given with the red bus-blue bus example. Consider that the respondent is required to choose between a red bus and a car (the odds ratio being 1:1). When the bus company paints half of its buses to blue and this is included in the analysis as a new alternative then the probabilities will change as for car= 0.5, red bus = 0.25 and blue bus = 0.25. This time the odds ratio becomes 0.5 / 0.25 = 2. This shows a violation of the IIA assumption. The models are tested for violation using Hausman Test for IIA. (Koop, 2008)

IIA assumption implies that the error terms are independently and identically distributed (IID). To obtain a meaningful expression for the probabilities, an assumption on the distribution of the error terms is made. If the error terms, ε, are independently and identically distributed and they follow a type I extreme value (also known as Gumbel, Weibull or double exponential) distribution, an expression for the choice made can be derived. The type I extreme value distribution for the error terms can be shown by:

$$P(\varepsilon_j \leq \varepsilon) = \exp(-\exp-\varepsilon) \quad (19)$$

Starting from this term and after necessary integrations and transformations the resulting expression is found as;

$$P_j = \frac{1}{\sum_{k=1}^{K} \exp -(V_j - V_k)} \quad (20)$$

Which is equal to:

$$P_{ij} = \frac{\exp(V_{ij})}{\sum_{k=1}^{K} \exp(V_{ik})} \quad (21)$$

This expression is called the conditional logit model (CLM), or multinomial logit model (MNL). There are other models such as nested logit and random parameters logit model to use when the IIA property does not hold but their detailed descriptions will not be given here.

An overall utility expression, for a model having three attributes can be shown as:

$$U_j = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \varepsilon_j \quad (22)$$

2.3.5. Estimation of Logit Model

The estimation of the logit models under random utility theory is done with Maximum Likelihood Estimation (MLE). This method gives parameter estimates that are most likely to give the observed data in the sample. The Maximum likelihood function for multinomial logit models is given as:

$$L = \prod_{i=1}^{I} \prod_{j=1}^{J} P_{ji}^{f_{ji}} \quad (23)$$

Where L denotes the likelihood function, i denotes the respondent, j denotes the alternative, P denotes the probability and f_{ji} =1 when alternative j is chosen and f_{ji} =0 otherwise (Louviere et al., 2000).

To avoid the multiplications of probabilities natural logarithm of the function can be used. Moving from equation 23, the log-likelihood function is given as:

$$L^* = \sum_{i=1}^{I} \sum_{j=1}^{J} f_{ji} \ln P_{ji} \quad (24)$$

Where L* = ln(L).

When we use the MNL equation given in equation 21 above for P_{ji}, only βs will be left as the unknowns, because Xs and fs are known. So the maximization of the function can be done, which is an iterative process and it is usually done by the computers and software packages nowadays.

To obtain a meaningful interpretation for the significance testing, a comparison should be made between the models. One model would be a restricted (base) model where the coefficients of all parameters are assumed to be zero, so there's only the intercept term (null hypothesis). The other is the unrestricted model where the coefficients are different than zero. When the log likelihoods of these two models are calculated and the difference is taken, multiplying it by -2 gives a chi-square distribution with degrees of freedom equal to the independent variables. (constant term omitted). A large chi-square value means an improvement in the model when compared to the baseline model. So, the test statistic is $-2[\log L_R - \log L_U]$.

McFadden suggests another method to assess goodness of fit. It shows the percentage improvement in the log likelihood function when other parameters are included. This is called likelihood ratio index (ranging from 0 to 1) and it is given as

$$LRI = 1 - \log L_U / \log L_R \qquad (25)$$

2.3.6. Calculating Willingness to Pay

In most of the transportation and environmental choice experiment studies, WTP values are calculated from the resulting model. Since discrete choice models are linear, this property helps the analyzer in calculating the WTP values. When at least one attribute is measured in monetary terms, WTP can be found as a ratio of two parameters (coefficients, βs), holding all else constant. In this calculation, both of the attributes should be statistically significant. When the calculation is done, the attribute measured as the monetary term, is used in the denominator in the equation. (Hensher et al., 2005) The WTP is the ratio of the coefficient of the attribute of interest and the price coefficient. (Birol and Koundouri, 2008)

Let the initial state of the utility to be V^0, the new state to be V^1 and β_c to be the coefficient of the cost attribute. Then, the WTP is given as (Bateman et.al., 2002):

$$WTP = {\beta_c}^{-1} \ln \left\{ \frac{\sum_i \exp({V^1}_i)}{\sum_i \exp({V^0}_i)} \right\} \quad (26)$$

Letting βk to represent the coefficient of any attribute, from the above equation WTP can be stated as

$$WTP = \frac{-\beta_k}{\beta_c} \quad (27)$$

2.3.7. Responses to Surveys

It is important to get the most accurate answer from the respondents so that their stated WTP can reflect the actual situation. Since the stated preference techniques search for valuation of non-market goods, the possible real case should be transformed accurately to hypothetical cases.

Especially in face-to-face conducted surveys, many responses can be misleading. The best case can be thought of when the respondent answers thinking that his answer will affect the actions of the related parties and when he really cares about the result of the possible implementation of the scenario (Bateman et.al., 2002). But there are many cases seen with respondents not answering with care, because they do not believe in the responsible agencies are going to do what they are expected to do or they do not understand exactly the same thing the interviewer asks them. This is why the focus group meetings are important, that it gives chance to see how the prepared questions are understood.

When the respondents are stating their valuation (Stated Value), they do not necessarily state the WTP (or WTA) they would actually pay (Actual Value). They can say lower or higher than they would pay if the scenarios are to be realized. These differences in the stated and actual WTPs constitute the biases. The biases are very numerous in type, some examples are (Bateman et.al., 2002):

- Respondents give an amount different from their actual amount to please the interviewer.

- The stated amounts are not actual cases because the respondent misunderstands the scenario/information.

- The amounts differ because respondent gives more/less importance to some parts or to the whole of the good in question, which does not coincide with the interviewer's aim.

- Respondents give different WTPs because they think of the payment vehicle different from the interviewer's aim.

These are examples that can be reasons for preparing the surveys, considering the behavioral aspects of the respondents. The questions should be clear to them, so they would know which parts of the good they will value and which parts they will not. The questions should give the chance for the respondents to say that they are not sure or that they do not know what to say. This would be reflected as a negative response in the analysis but by doing so; the yea-saying bias can be minimized, since the respondents will not feel pressured to make a "correct" statement that can lead them to state higher values. Inclusion of opt-out availability should be made if a realistic outcome is expected, such as a guide to a new policy. (Ryan et al., 2008) To understand why protest-responses are present, a follow up question can be incorporated to find out why the respondent refused to answer or chose that specific answer. Jones et.al. (2008) Because of protesting, they can state zero WTP even when they would have a different amount in mind.

Also the questions should be prepared in such a way that after the survey, they can be analyzed for their indications of credibility of the scenarios, if a post-survey analysis is to be made.

CHAPTER III

ENVIRONMENTAL VALUATION IN GÖCEK: APPLICATION OF CHOICE EXPERIMENT

The purpose of the choice experiment study was to calculate the willingness to pay of the respondents for the environmental improvements in Göcek. Only after obtaining a monetary outcome, sustainable coastal management plans and policies can be created with accuracy. The non-market valuation in the area is done with a choice experiment and this experiment is applied with surveys as the main tools. In the preparation stage of these surveys three steps are followed which is shown in Figure 5.

Figure 5. Steps in Preparing a Choice Experiment Survey

First, to be able to collect necessary background information, the study area is examined with all of its geographic and socio-economic characteristics and its current problems are identified. In this case, environmental problems were the main concern for the surveys. Second, target population selection is made. Setting the sample population and locating them before the survey makes the conduction of survey more accurate and easier. As the last step choice cards including the alternatives, the main part of any choice experiment, are prepared. Detailed information about each step is given in the following sections.

3.1. Background information: Study Area

Fethiye-Göcek region, with its numerous bays for sailing and yachting is one of the specially protected areas in Turkey and this is why a lot of interest has been put into this region lately.

General Directorate of Natural Assets Protection (GDNAP) (formerly known as Environmental Protection Agency for Special Areas, EPASA) is the governmental authority which runs studies for the environment of Göcek region. This organization is established in 1989 and works under Turkish Ministry of Environment & Forestry. It has been founded with the aim of protecting the values of designated specially protected areas. Fethiye – Göcek region is declared as a specially protected area in 12.06.1988 by the Decree of Cabinet of Ministers numbered 88/13019. (GDNAP,2011)

Also, non-governmental organizations are trying to help in protecting Göcek and they are making many activities for the region. One of those organizations is Turkish Marine Environment Protection Association (TURMEPA). It is established by Rahmi Koç, in cooperation with Turkish Chamber of Shipping in 1994. Their main aim is to protect Turkey's coastal and marine environment. TURMEPA is running many projects in Göcek such as installing buoys and cleats to coasts and sea or making awareness increasing campaigns.

Göcek is a town of Fethiye in Muğla Province. Its coordinates are 36° 45′ 25″ N, 28° 56′ 40″ E and its location is shown in Figure 6. Göcek is known with its attractive sea scenery and tourism activities, mainly yachting. Fethiye–Göcek Specially Protected Area has an 816 km^2 area and Göcek has a land area of 42 km^2. The population according to 2009 Census is 4039 people, although the population increases approximately two times during summer seasons. The proximity of Göcek to Dalaman Airport (one of the highly used airports in Turkey) also increases its use for yacht tourism. Because yacht owners usually travel by planes and transfer from Dalaman to Göcek, which is very easy because of the short distance.

Figure 6. Göcek's Location, Satallite Image

There are six marinas serving for yachting activities: Port Göcek Marina, Club Marina, Skopea Marina, Municipality Marinas, Marinturk Göcek Village Port and Marinturk Göcek Exclusive. Skopea, Port Göcek and Municipality Marinas lie close in the center of Göcek, Club marina is further on the sea and the last two ones are recently built.

Despite its small area and low population, boat tourism sector affects the environmental quality of the town. In 2007 there were 542 boats in the bays of Göcek, whereas this number has increased to 788 in 2010. When the whole Fethiye, Dalaman and Göcek bays are considered, there were 967 boats in 2007 and 1094 boats in 2010 (METU, 2007) All of the boats using the bays of Göcek, as well as Fethiye and Dalaman bays produce wastewater and solid wastes. The collection of these wastes are done by the 2 wastewater collection boats, 2 solid waste collection boats and the stations situated on land. Although there are 2 boats for wastewater and solid waste collection, only one boat from each group is used currently for the collection purposes. Two boats do not serve at the same time. There is one wastewater treatment plant in Göcek, designed to serve for 15.000 people until 2015, and for 30.000 people until 2030, with discharge rates of 62 m^3/h and 158 m^3/h for the given years respectively. For solid waste collection, there is one landfill covering an area of 60.000 m^2 and

designed to serve a population of 15.000 people with a yearly capacity of 6350 tons.

In the previous study "Monitoring by Remote Sensing and Investigation on Yacht Carrying Capacity in the Marine Protected Areas" done for Fethiye and Göcek bays, the boat carrying capacity of Fethiye Bay is found as 1111 boats. It can be seen that the carrying capacity is almost reached for the bays and already decreased water quality will be in a worsening state. Water quality is decreasing because the effective use of the waste collection stations cannot be realized since many boats illegally discharge their bilge waters to sea. The estimated wastewater discharge amounts for 2007 has been calculated as 5827 m^3/year, 57% of which is discharged during summer months. According to the measurements done in August 2009,within the same study mentioned above, the evaluated water samples taken from several points showed that there is a high boat activity in the sampled regions. These measurements also showed that chemical oxygen demand (COD) and oil and grease values are higher than the standards for General Sea Water Quality Criteria, given in Turkish Water Pollution and Control Regulation. Fecal coliform measurements indicate an increasing pattern towards passing the permitted limits for the standards for recreational use. The wastewater discharge from the boats present in Göcek and Dalaman bays are calculated as 360 m^3/day and solid waste build-up is calculated as 4 tons/day (METU, 2007). Considering all the measurements and the studies done in the region, it is clear that action should be taken to protect the water quality.

With the information obtained about the region a general conclusion can be made about the region's environmental state (METU, 2007): The increasing popularity in yacht tourism in Göcek have led to several environmental problems in the region. Main problems can be given as:

- Illegal wastewater discharge into sea
- Solid waste existence in sea environment
- Anchoring/tying boats in unsuitable places which ends up in the decrease in seagrass health and population

These problems constituted the base for the construction of survey questions and choice cards/alternatives. Along with identifying the environmental

problems, possible solutions are proposed for each problem. To overcome the wastewater and solid waste discharge into sea, increasing the number of wastewater and solid waste collection stations (both on land and in sea) is proposed. For the protection of seagrasses and marine animals increasing the number of buoys and cleats is presented as a feasible solution. The last general environmental protection measure was proposed as increasing awareness with several campaigns throughout Göcek.

3.2. Identifying Target Population

Göcek's popularity in tourism creates a wide array of beneficiaries. First of all, there are the local residents, living there throughout the year. Some of these residents use the sea for earning a living, some for only recreational purposes and a small part do not use the sea at all. But everybody is affected from the possible changes occurring in the (water) environment of Göcek. Secondly, there are captains and boat owners, who are not necessarily from Göcek. Some of them also live in Göcek, but if they are working as a captain, or use their both regularly, the locals are counted as "captains and boat owners". Thirdly, there are the tourists, which make a big portion of the target population. Because this portion, approximately doubles the population of Göcek in summer months. So, in the survey, three groups of population have been included.

3.3. Creation of Scenarios

Detailed information about the study area and identifying the target population leads to the scenario creation. Since scenarios should clearly represent the different situations, first a draft survey is prepared along with the draft choice cards. Then this draft survey is tested during a focus group study in the region. Focus group studies are usually done by conducting the draft survey with a small sample from the target population and by meetings with the stakeholders of the area. The aim of the focus group surveys and meetings is to "polish" the questions and be ready for a broader experiment and analysis with a more comprehensive design.

3.3.1. Focus Group (FG) Study

To be able to identify the attributes more clearly and to test the first phase survey, a focus group study was made with 14 respondents, on 21 - 22 August 2010. Also meetings with several stakeholders of Göcek were arranged throughout the FG study, to be able to assess if there were any missing information regarding the survey. The meetings are done with the mayor of Göcek and authorities from TURMEPA and GDNAP. In this survey, questions about Göcek's current state and people's perception about it, questions regarding people's prediction about future environmental conditions and demographic questions were present.

As mentioned before, the main improvements that are needed to be done in Göcek, in terms of environmental issues, were about seawater quality and about protecting the marine life. So for FG study, attributes of "Water quality values", "Sea grasses" and "Price" were chosen. Their levels were set as given in Figure 7.

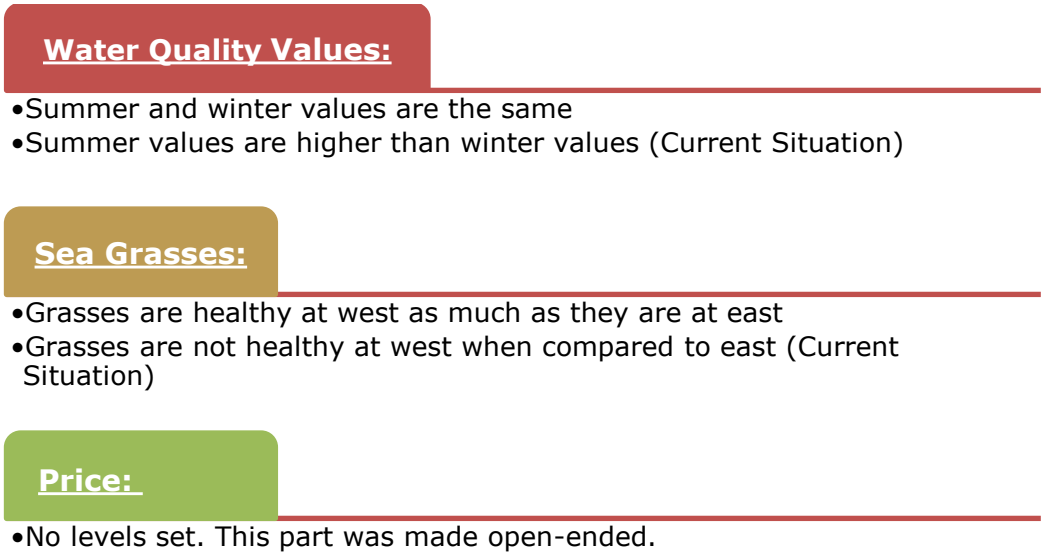


Figure 7. Selected attributes in Focus Group Study

After selecting the attributes, choice cards are prepared with different scenarios.

A sample choice card can be seen in Table 3.

Table 3. Sample choice card for FG study

	Scenario 1	Scenario 2	Scenario 3
Water Quality Values (Biological, Chemical, Physical)	Summer and winter values are the same	Summer and winter values are the same	Summer values are higher than winter (Current Situation)
Sea Grasses	Grasses are healthy at west as much as they are at east	Grasses are not healthy at west when compared to east (Current Situation)	Grasses are healthy at west as much as they are at east
Price (Increase)	……	……	……

3.3.2. Main Survey

After the focus group surveys, the attributes were seen as not satisfactory and not clear. Therefore, for setting up a full frame, it has been decided to categorize the attributes in three sections as Biological, Chemical and Physical. Biological and Chemical sections are taken together since they are closely related with water quality. The water analyses showed that there are problematic parts in several microbiologic and chemical parameters and therefore; the first attributes section covers biological and chemical parts, under the title of "Water quality levels".

The physical part, having the title of "Marine Life", deals with the usage of anchors (or not-using buoys/cleats) which threatens the habitats of the marine animals and plants. So, this section is mostly focused on the habitat protection.
The last one was the price attribute which will help us to ask to the respondents the amount to be paid. The price attribute requires the selection of a payment vehicle. The chosen payment vehicles after the focus group survey for each target population are given below:

Residents (Local): An increase in monthly water bills
Boat owners / Captains: An increase in their marina rent
Tourists: An increase in their tour payments (one-time)

The levels for each of the attributes are set as shown in Figure 8. Percent values or exact numbers were not chosen due to the possibility of not being representative or factual. It has only been evaluated in comparison to today's levels: getting better or staying the same. These are the chosen levels both for "water quality levels" and "marine life" attributes. For the price attribute, four different levels have been set. These levels are determined after the focus group study. Price ranges are identified from the answers the respondents gave to the open ended price increase question and according to these answers applicable price increases are set. For local residents and tourists an increase of 5 to 20 TL and for captains and boat owners, an increase of 10% – 75% was used. These are calculated from the information gathered in the focus group study. Percent increases are used for the last target group, unlike the other two, because it has been seen that every captain/boat owner were paying their marina rent for different periods of time and it was not feasible to use a set period for all the respondents in that population group.

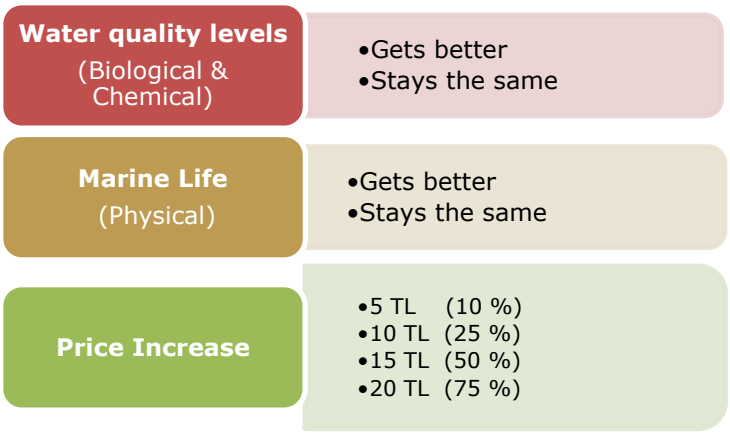


Figure 8. Attributes and Levels

After selecting the attributes and levels, 10 choice cards have been prepared by using SPSS 17 Statistics Software. SPSS output is then modified manually to leave out the dominant or not meaningful scenarios. In each choice card there were three scenarios, Scenario 3 always being the opt-out scenario where no change in levels occurs and no payment increase is needed. Scenario 1 and 2 were the combination of different cases prepared with the given attributes and levels.

A sample choice card from the main survey can be seen in Table 4.

Table 4. Sample Choice Card from main survey

A	Scenario 1	Scenario 2	Scenario 3
Water quality levels (biological, chemical)	Water quality level that would not threat human health and that would not hinder swimming and water sports activities	Water quality level that would threat human health & marine life and that would hinder swimming and water sports activities	Water quality level that would threat human health & marine life and that would hinder swimming and water sports activities
Marine Life (Physical)	Protecting the necessary habitat to be able to maintain a healthy marine life	Protecting the necessary habitat to be able to maintain a healthy marine life	The risk of habitat loss for marine creatures
Amount to be paid (increase)	10 TL	5 TL	0 TL

3.4. Survey Structure

As generally applied by other researchers the choice experiment survey was composed of three sections: Gathering demographic data, assessing respondents' view of the situation and presenting the scenarios. The detailed questions of these sections are presented in Table 5.

There are many boat related questions in the survey. This was mainly because the interest of this study is the coastal management of Göcek and Göcek's main importance lies in its bays and marinas. After asking the respondents if they own a boat or not, the questions then continued about boat related matters if they own a boat or they are skipped if the respondent does not have/use a boat.

3.5. Conduction of Surveys

The survey was conducted in 6 days in between 31 August 2010 – 5 September 2010 with 7 interviewers. The interviewers were chosen from different areas to be able to obtain a diverse team: 3 environmental engineering students, 1 geological engineering student, 1 international relations student, 1 sociology student and 1 fisheries engineering student. 6 of the interviewers have been given a short information session before the start of the survey run on 31 August 2010 about how to conduct the survey, how to not interfere with the respondents' choices and how to record the data.

Face-to-face interviews are made with random selections. Mainly, marinas were chosen to be able to speak with captains and boat owners, residential areas were chosen to find local residents and town center with the shops and cafes is chosen to speak with tourists. Each survey took 20 minutes to finish in average.

Total of 312 surveys have been done and after data entry and data cleanup, 286 usable surveys (91% of the whole survey number) have been obtained for the initial analyses. The questions and the coding of the answers of these questions in the surveys is shown in Table 5.

Table 5. Survey Questions and Coding

Questions	Variable	Responses
Gender	GENDER	0: Female 1: Male
Age	AGE	Continuous Variable
Purpose in being in Göcek	PRPS	1: Tourism 2: Lives in Göcek 3: Work related
How long have the respondent been living in Göcek	LIVEFOR	Continuous Variable
Occupation		Verbal (Not coded)
Marital status	MARI	1: Married 2: Single 3: Divorced/Widow

Questions	Variable	Responses
Education	EDU	0: Illiterate 1: No diploma 5: Elementary School 8: Middle School 11: High School 15: University 17: Master's Degree 18: PhD
Income	INCEU / INCTL	Continuous Variable
Owning a boat in Göcek	BOATOWN	1: Yes 0: No
Boat type	BTYPE	1: Wooden 2: Fiber
Boat length	BLNGTH	Continuous Variable
Has the respondent been in Göcek before	BEENBFR	1: Yes 0: No
How long has the respondent been in Göcek		Continuous Variable
Reasons to be in Göcek	R*	1: The sea /nature is beautiful 2: Service supply is good 3: Cheap 4: Not crowded, I can rest well 5: I can do fishing 6: Other
Activities done in Göcek	A*	1: Yachting 2: Swimming 3: Sunbathing 4: Walking/running 5: Water sports 6: Fishing 7: Attending Tours 8: Other

Questions	Variable	Responses
Paid activates	P*	1: Yachting 2: Swimming 3: Sunbathing 4: Walking/running 5: Water sports 6: Fishing 7: Attending Tours 8: None 9: Other
Tour payments	TRPAYEU / TRPAYTL	Continuous Variable
Daily spendings	DSPNDEU / DSPNDTL	Continuous Variable
Average water consumption cost	WTRPYEU / WTRPAYTL	Continuous Variable
Marina/berthing rent	MARPAYEU / MARPAYTL	Continuous Variable
How long does the respondent stay in marinas per year	MARTIME	Continuous Variable
How long does the respondent stay and spend time in bays per year		Continuous Variable
Presence of wastewater treatment unit in boat	WWTU	1: Yes 0: No 2: No answer
Presence of wastewater transfer equipments in boat	WWEQ	1: Yes 0: No 2: No answer
Does the respondent consider installing a wastewater treatment unit in boat	WNTWWTU	1: Yes 0: No 2: No answer

Questions	Variable	Responses
Does the respondent consider installing wastewater transfer equipment in boat	WNTWWEQ	1: Yes 0: No 2: No answer
Wastewater discharge from boat	WWDSCH	1: Discharged into sea 2: After storing, I give it to wastewater collection boats 3: After storing, I give it to wastewater collection stations on the coast/land
Adequacy of number of wastewater collection boats	WWBOAT	1: Yes (enough) 0: No, should be increased
Adequacy of number of wastewater collection stations on land	WWSTN	1: Yes (enough) 0: No, should be increased
Does the boat owner recycle his solid waste	RECYCL	1: Yes 0: No
Solid waste discharge from boat	SWDISP	1: I dump to sea 2: After storing, I give it to solid waste collection boats 3: After storing, I give it to solid waste collection stations on coast/land
Adequacy of number of solid waste collection boats	SWBOAT	1: Yes (enough) 0: No, should be increased
Adequacy of number of solid waste collection stations on land	SWSTN	1: Yes (enough) 2: No, should be increased
Boat tying	BOATTIE	1: I anchor where I found appropriate and tie it to a nearby place (trees, rocks etc.) 2: I tie it to cleats and buoys
Adequacy of number of cleats	BUOY	1: Yes 0: No 2: Not sure

Questions	Variable	Responses
Presence of environmental problems in Göcek	ENVPR	1: Yes 0: No 2: I don't know
Possibility of future environmental problems in Göcek	FTRPR	1: Yes 0: No 2: I don't know
Membership to an environmental organization	ENVORG	1: Yes 0: No
Existent or possible environmental problems in Göcek	EP*	1: Mixing of wastewater with sea 2: Mixing of solid waste with sea 3: Damaged seagrass, trees on land and other plants, the decrease in their population 4: Decrease in population and variety of animals on sea and land 5: Other
Does the respondent thing environmental problems can be avoided via awareness increasing	AWR	1: Yes 0: No 2: Not sure
Most effective awareness increasing measures	AW*	1: Briefings that would be given to passengers on tour boats, before the trip 2: Posters & flyers to the boats that will be staying in the marinas/sea 3: A webpage on municipality's webpage about preventing pollution 4: Other
Willingness to pay	WTP	1: Yes 0: No

Questions	Variable	Responses
Reasons for willing to pay	YES*	1: Future Generations 2: I will come again 3: Every creature has a right to live 4: I feel good contributing to environmental improvement 5: Other
Reasons for not willing to pay	NO*	1: No need for an improvement 2: Polluters should pay, I'm not responsible 3: Government /municipality should handle this 4: I don't think my money will reach to the right place 5: I cannot afford 6: Other

***** indicates the number of the option for the given variable, **e.g.** NO6: Reason for not willing to pay – I cannot afford

CHAPTER IV

RESULTS AND DISCUSSION

Analysis of the survey data is made by using the software NLOGIT 4.0 and SPSS 17.0. Basic statistical analysis is done with SPSS 17.0 and for the multinomial logit runs and model construction NLOGIT 4.0 is used. NLOGIT is written by William H. Greene and it is distributed from "Economic Software Inc." NLOGIT 4.0 is an extension of LIMDEP software and it is used in model estimations and simulations, analysis of multinomial choice data as well as survey and market data. This software became the leading package for multinomial discrete choice models and numerous choice experiment researchers have used this software for their analysis. (Econometric Software, Inc., 2009) A screenshot from the software interface is given in Appendix A.

In the following sections, first the descriptive statistics and frequencies will be given. Then the multinomial logit runs for model construction and willingness to pay calculations are presented. Lastly, after calculating the cost of investments, aggregation of willingness to pay amounts is made and these values are compared with each other.

4.1. Descriptive Statistics

Demographic variables:

The descriptive analysis about main demographic variables in Table 6 shows that average age in our survey population is 40 years old. 26% of the respondents are composed of female respondents and 74% is composed of male respondents. 23% of the respondents are foreign ones, composing he tourists target group. Results show that 56.6% of the respondents were married, 38.8% were single and 4.5% was divorced/widow. Average education has come up as 11.9. Value of 11 shows the high school graduate range, so it can be concluded

that the average education level is being a high school graduate. The mean income is found as slightly more than 3,600 TL per month. When the whole data set is considered, people on vacation were also surveyed and both local and foreign tourists are expected to earn more when compared to the people living there in all seasons. The average daily amount they spend while they are in Göcek is calculated as 72 TL. This data set analyses the whole type of respondents so the standard deviation is high, since locals tend to spend less or even none whereas tourists and especially yacht users tend to spend very much, including their marina expenses.

Table 6. Demographic Variables for Whole Data Set

	N	Min.	Max.	Mean	Std. Dev.
Gender	286	0	1	.74	.44
Age	286	18	80	39.6	13.14
Foreign Respondent	286	0	1	.23	.42
Marital Status Married: 56.6% Single: 38.8% Divorced/Widow: 4.5%	286	1	3	1.48	.58
Education	286	0	21	11.9	3.78
Income (€)	284	129	25318	1870	2481.10
Income (TL)	284	250	48790	3604	4781.61
Daily spendings (€)	283	0	1037	37	76.73
Daily spendings (TL)	283	1	2000	72	147.90

The total number of respondents is 286, 61 people corresponding to "boat owners & captains", 111 to "local residents" and 114 to "tourists" target group. Although these values are low, they are in-line with several previous choice experiment studies; Rolfe's study in 2000 had 105 respondents, 87 respondents were surveyed in a marine recreation study (Wielgus et al., 2009) and 103 foreign respondents were present in a national park case study (Juutinen et al., 2011). Birol and Koundouri (2008) investigated the choice experiment studies done in European Union and the sample sizes used were ranging between 93-2000 surveys, where higher amounts are obtained by computer based or mail surveys.

When the data set is examined by looking at the three different target groups, the demographic statistics results change as given in the Tables 7, 8 and 11. Figures a to 9-23 shows the histograms for selected variables.

Table 7. Demographic Variables for Captains

	N	Min.	Max.	Mean	Std. Dev.
Gender	61	0	1	.95	.218
Age	61	18	70	37.3	12.9
Marital Status Married: 50.8% Single: 49.2%	61	1	2	1.49	.504
Education	61	5	17	10.97	3.12
Income (€)	61	155	7780	1627	1627
Income (TL)	61	300	15000	3138	3136
Daily spendings (€)	61	.00	1037	63.6	149.3
Daily spendings (TL)	61	1	2000	124	287.8
Marina payment (€)	61	33	21000	1470	3218
Marina payment (TL)	61	65	40483	2834	6207

95% of the captains were males and the average age of all the captains is 37 years. Education level is being a high school graduate and the married portion is found as 50.8%. Their average monthly income is 3138 TL and they spend 124 TL in average per day. The average berthing rent/marina payment is found as 2834 TL. The histograms showing the frequencies of these variables are given in the following figures.

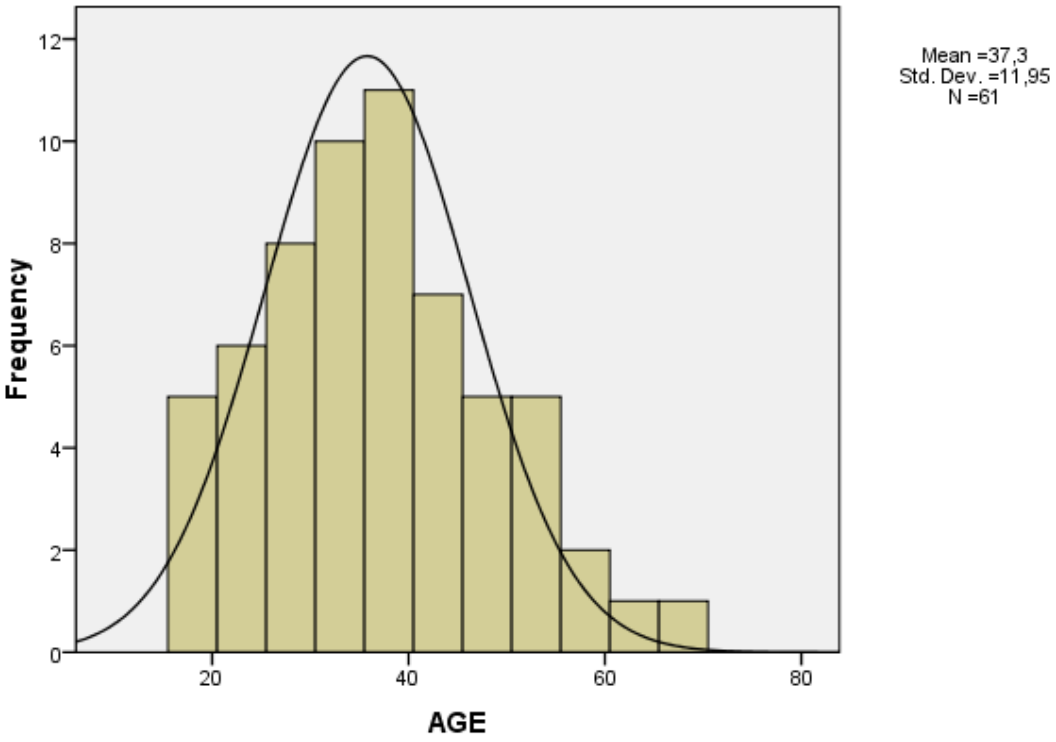


Figure 9. Histogram Showing Ages of Captains

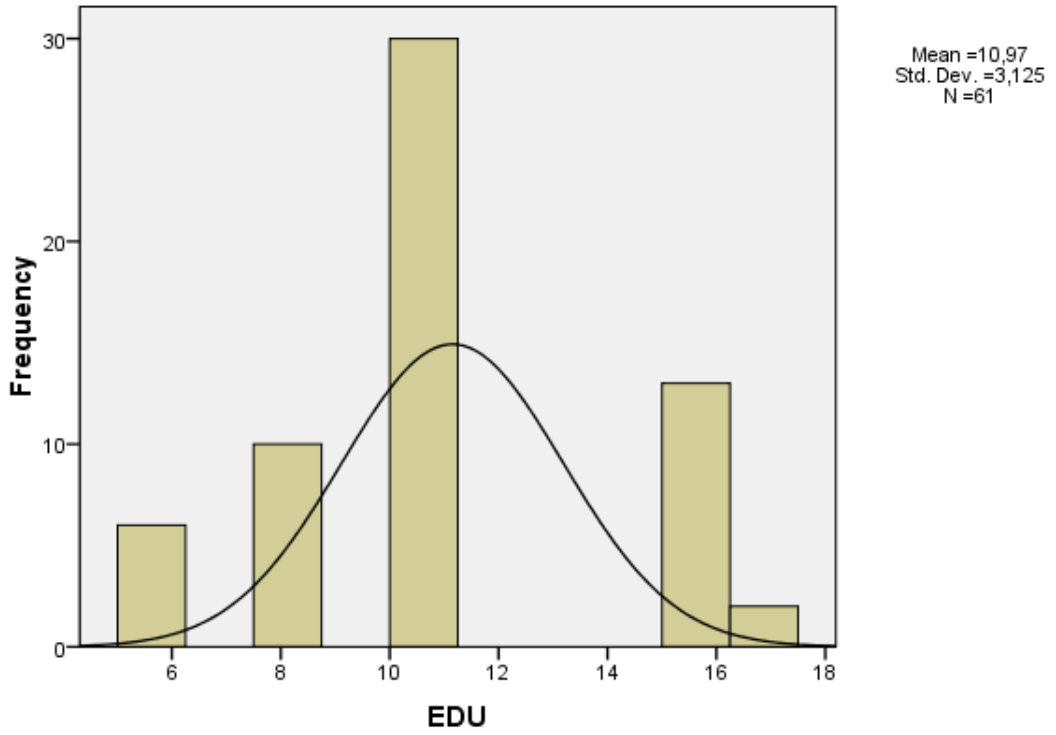


Figure 10. Histogram Showing Education Levels of Captains

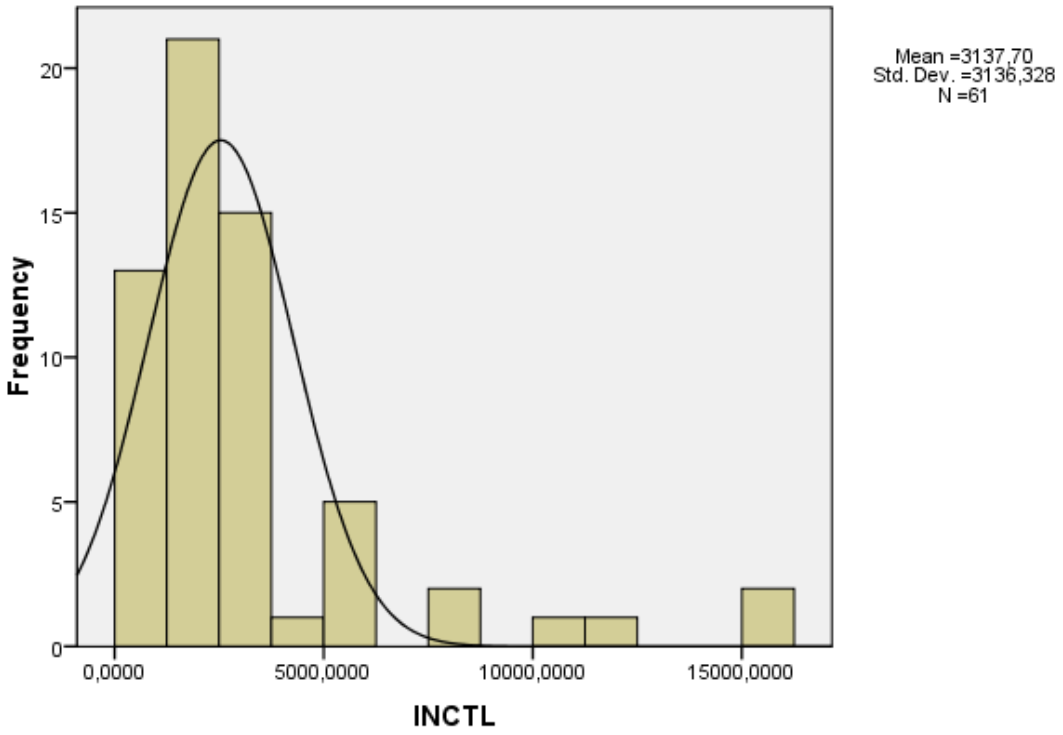


Figure 11. Histogram Showing Incomes of Captains (TL)

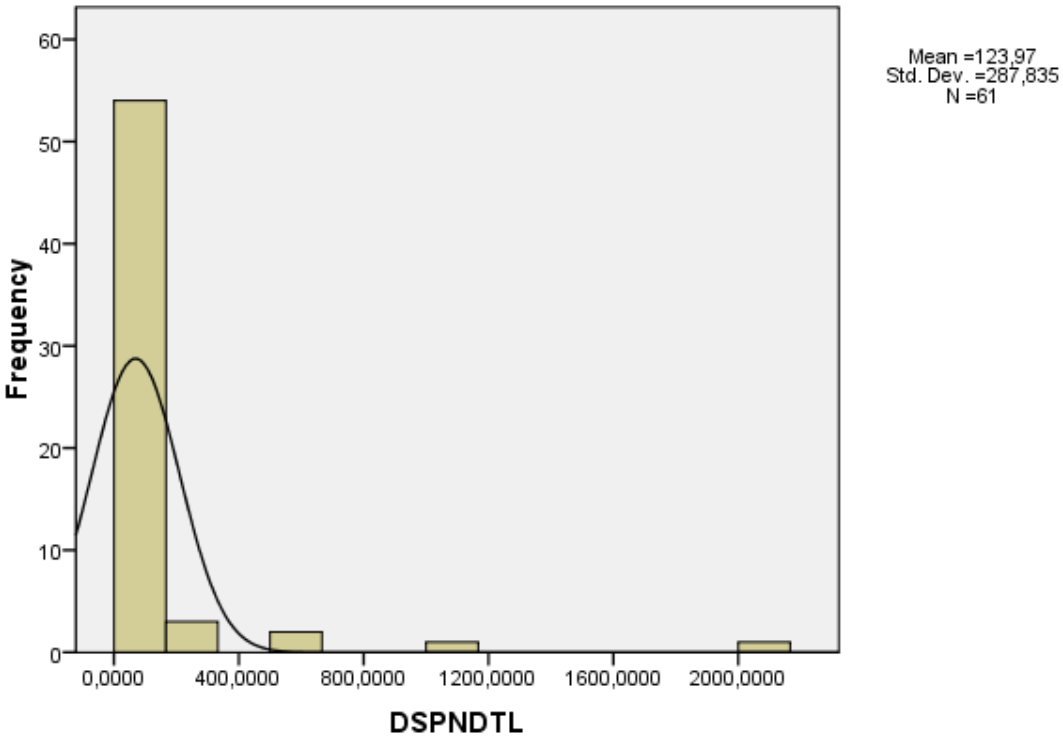


Figure 12. Histogram Showing Daily Spendings of Captains (TL)

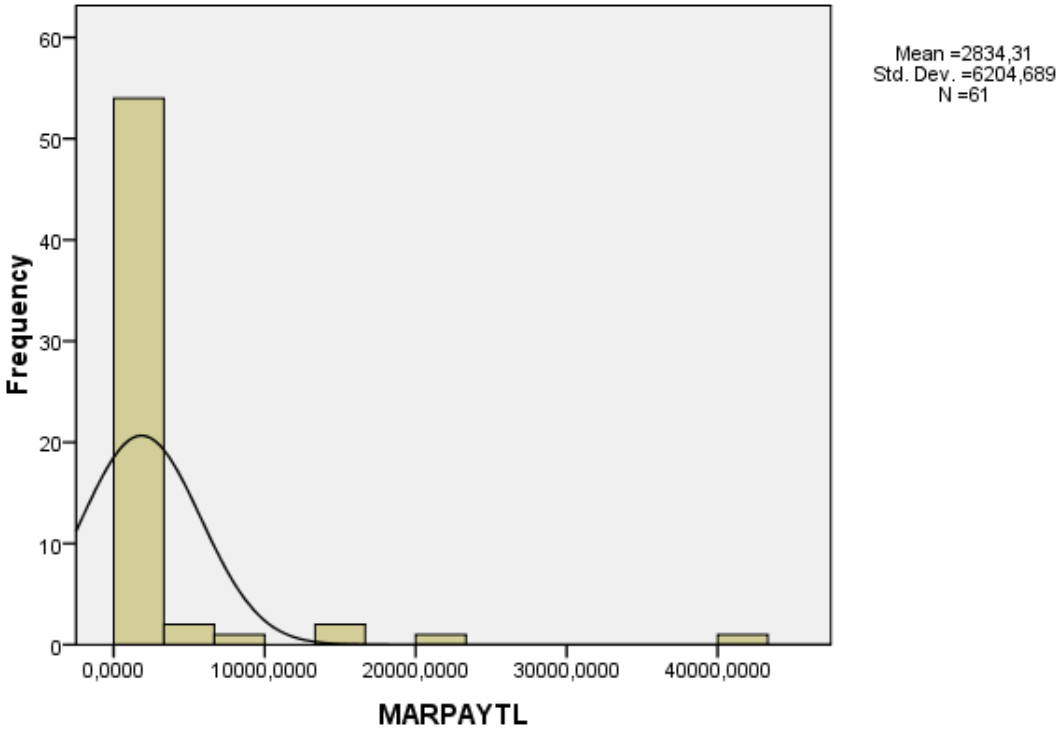


Figure 13. Histogram Showing Marina Payments of Captains (TL)

Table 8. Demographic Variables for Local Residents

	N	Min.	Max.	Mean	Std. Dev.
Gender	111	0	1	.76	.431
Age	111	18	71	40.2	11.95
Marital Status Married: 63.1 % Single: 31.5% Divorced/Widow: 5.4%	111	1	3	1.42	.596
Education	111	0	17	10.77	3.74
Income (€)	111	259	5187	1003	804
Income (TL)	111	500	10000	1933	1550
Daily spendings (€)	111	1	129	22.7	22.8
Daily spendings (TL)	111	2	250	45	44.2
Monthly water bill (€)	88	0	155	25.3	26.3
Monthly water bill (TL)	88	0	300	49.8	50.8

76% of the local residents were male respondents. Average age of local residents is 40 and 63.1% of them are married. Mean education level is found

as being a high school graduate. Average monthly income is 1933 TL and average daily spendings of local residents is 45 TL. They pay 49.8 TL per month per their water bills. The minimum value of zero corresponds to the respondents who are using wells as water resources. The histograms showing the frequencies of these variables are given in the following figures.

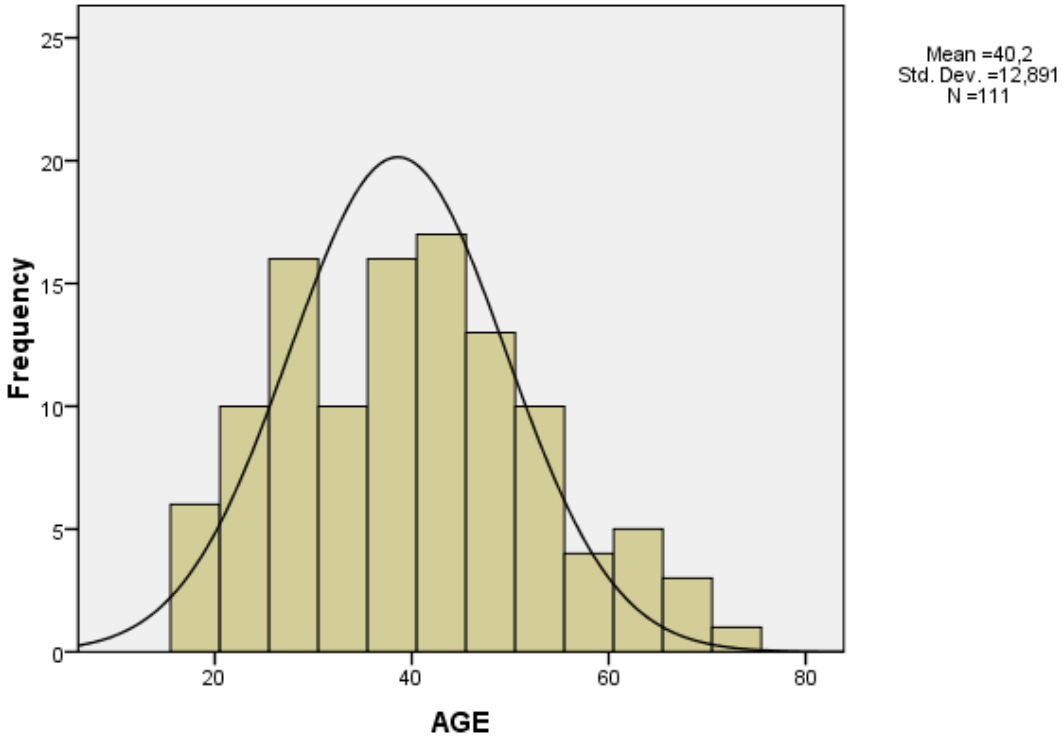


Figure 14. Histogram Showing Ages of Local Residents

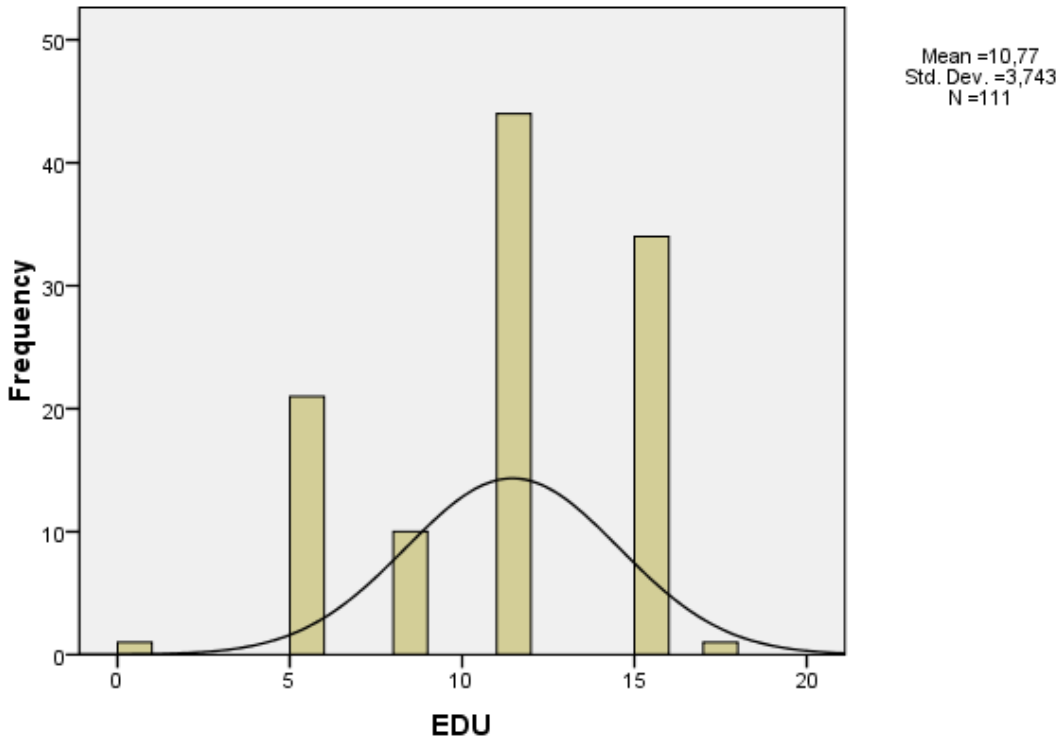


Figure 15. Histogram Showing Education Levels of Local Residents

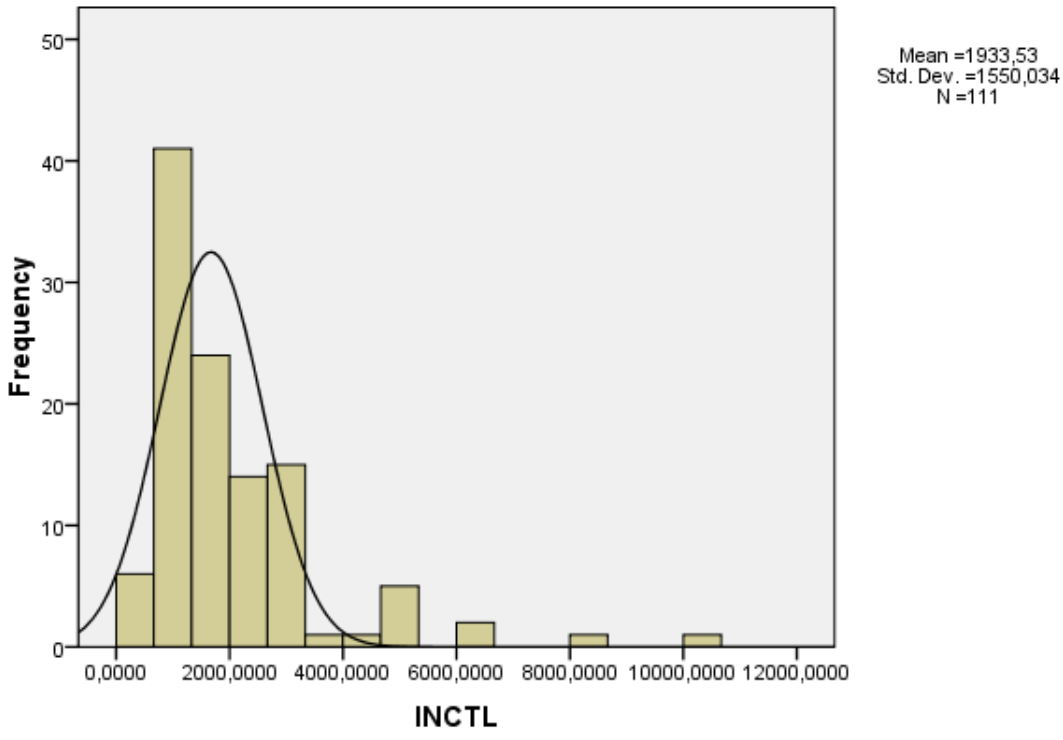


Figure 16. Histogram Showing Incomes of Local Residents (TL)

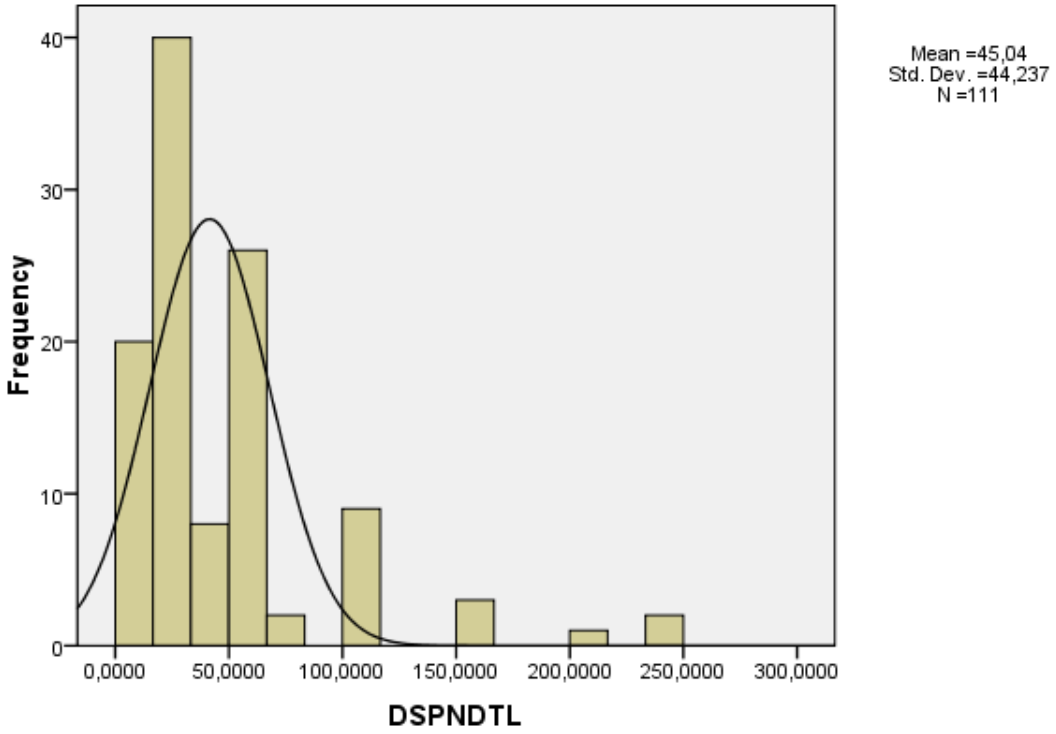


Figure 17. Histogram Showing Daily Spendings of Local Residents (TL)

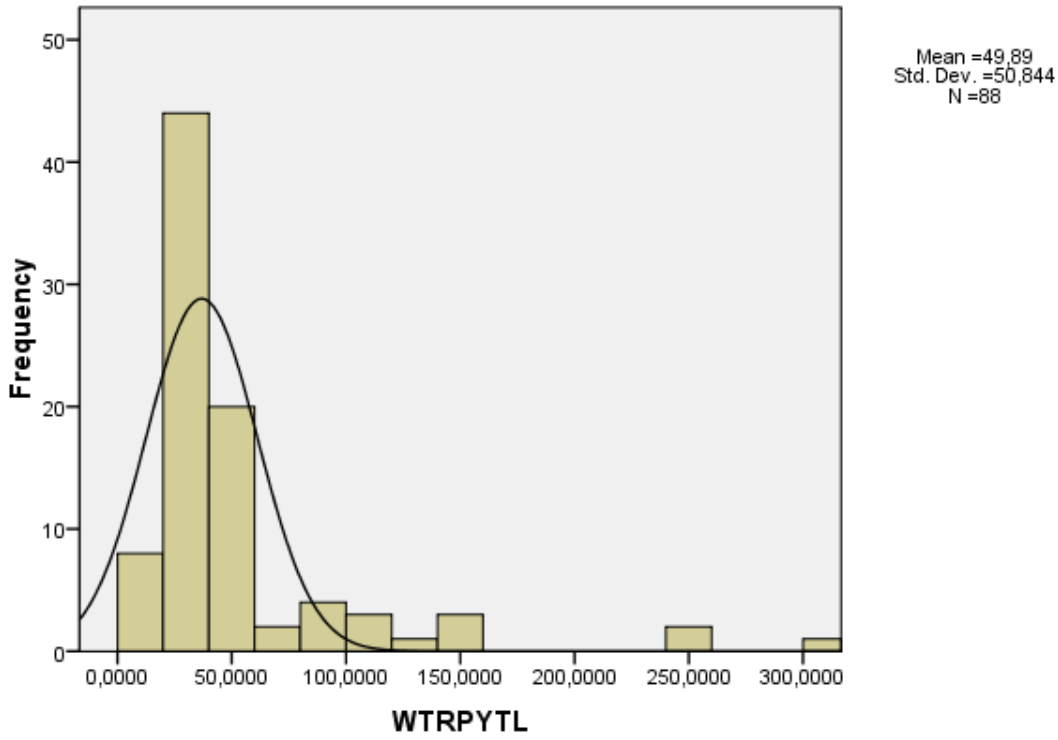


Figure 18. Histogram Showing Monthly Water Bills of Local Residents (TL)

To look at the representativeness of the data obtained, EPASA'S Report (2010) is used. But since the surveys in the report is done with only local residents, the comparison here is also based on results for local residents. The report uses 403 surveys whereas case study done has 111 surveys. The report's and this study's outcomes for age variable is shown in Table 9. Even though there are differences in age ranges of 18-24 and ranges covering over 45 years, the ranges covering the average age are similar in both reports.

Table 9. Comparison of Age Percentages

	EPASA Report (%)	Case Study (%)
18 - 24	9.7	12.6
25 - 34	24.6	24.3
35 - 44	24.1	26.1
45 - 54	16.9	24.3
55 - 64	14.1	9.1
>65	10.7	3.6
Total	**100.0**	**100.0**

When education levels are compared it is seen that case study results under-estimated the elementary school graduates and over-estimated the high-school and university graduates, as shown in Table10. In 2009 Census, elementary school graduates is given as 34.8%, high school graduates are given as 24.4% and university+postgrdaute degree graduates are given as 12.3%. According to these values the results found here are not fully representative of education levels but this is probably due to the selection of the location for the survey conduction.

Table 10. Comparison of Education Percentages

	EPASA Report (%)	Case Study (%)
Illiterate	0.5	0.9
Elementary School	56.9	18.9
Middle School	9.7	9.1
High School	22.1	39.6
University	10.2	30.6
Post-graduate Degrees	0.7	0.9
Total	**100.0**	**100.0**

The average income found from the values in EPASA's report (2000) is 991 TL whereas the income found from the case study is 1933 TL which is approximately twice the value given in the report. There are no values given for provinces and its regions in the national censuses, so a more accurate comparison cannot be made. But the difference observed may be coming from the portion of shop owners in the case study and that this study did not go further in the outer districts where the profiles of the local residents might be different, affecting their income.

Table 11. Demographic Variables for Tourists

	N	Min.	Max.	Mean	Std. Dev.
Gender	114	0	1	.61	.49
Age	114	18	80	40.38	13.94
Foreign Respondent	114	0	1	.59	.49
Marital Status Married: 53.5% Single: 40.4% Divorced/Widow: 6.1%	114	1	3	1.53	.613
Education	114	1	21	13.39	3.64
Income (€)	112	129	25318	2860	3442
Income (TL)	112	250	48790	5514	6633
Daily spendings (€)	111	1	360	36.6	42.5
Daily spendings (TL)	111	2	694	71.7	81.8
Tour payment (€)	83	10	75	22.6	12.3
Tour payment (TL)	83	20	144	42.3	23.4

Tourists target group is composed of 61 % male respondents and the avarage is found as 40 years. 59%of the tourists were foreign ones. The marriage percentage is 53.5% and average education level is higher than captains and local residents. Average monthly income is found as 5514 TL and average daily spendings is 71.7 TL. Tourists are found to be paying 144 TL in average per tour. The histograms showing the frequencies of these variables are given in the following figures.

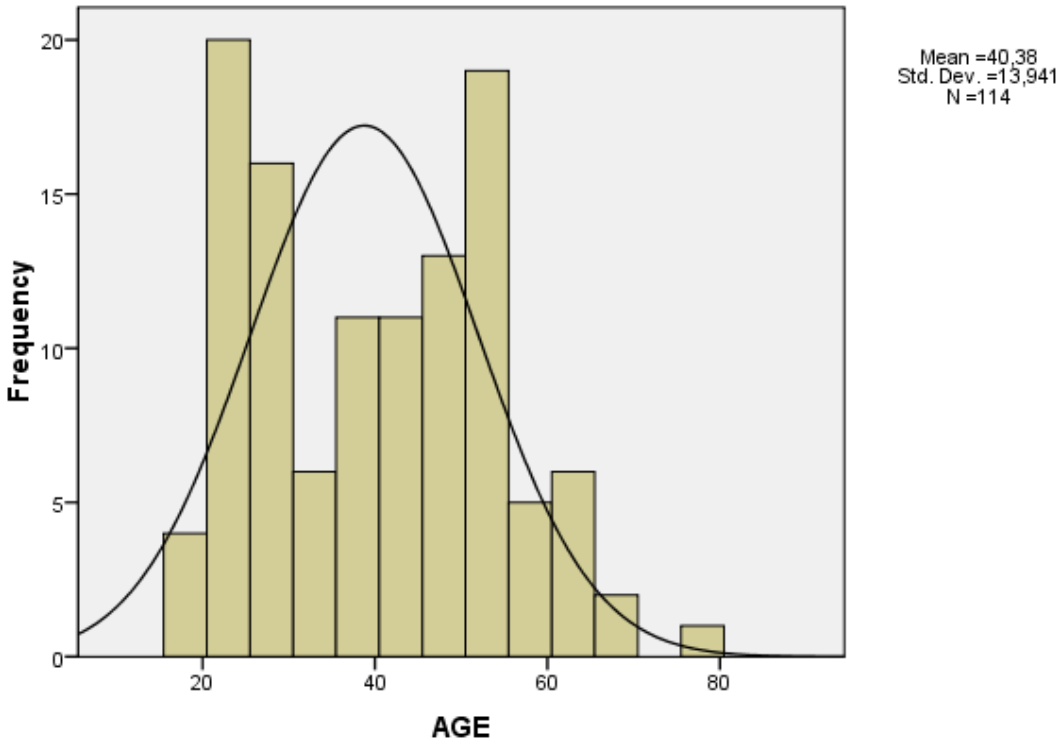


Figure 19. Histogram Showing Ages of Tourists

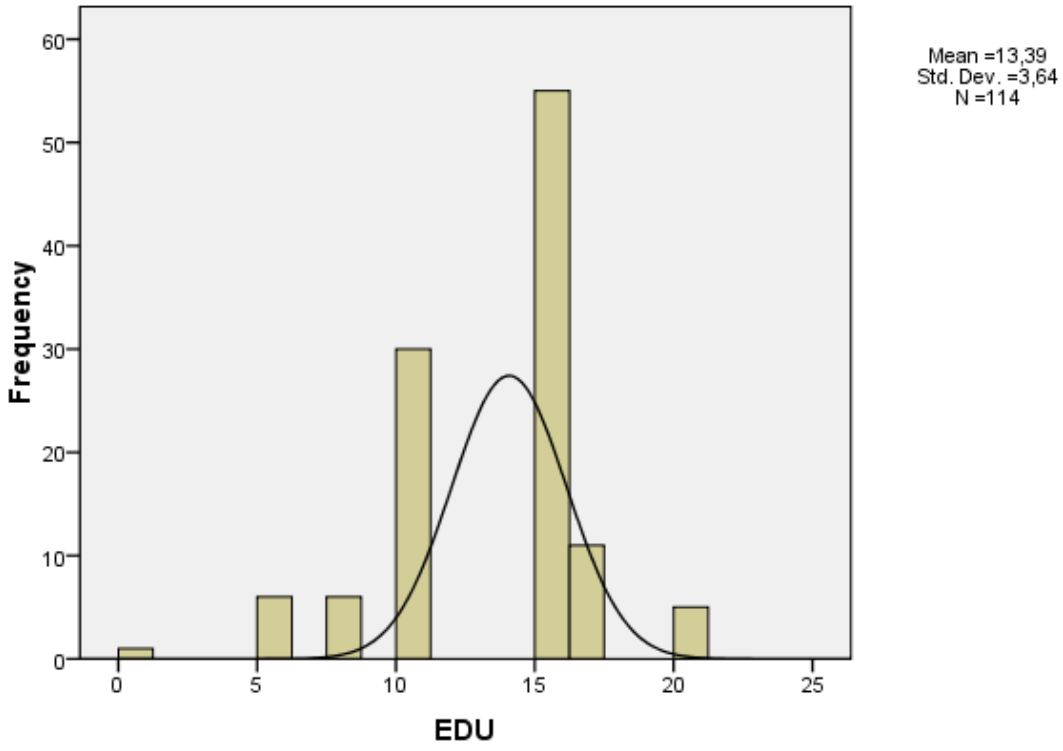


Figure 20. Histogram Showing Education Levels of Tourists

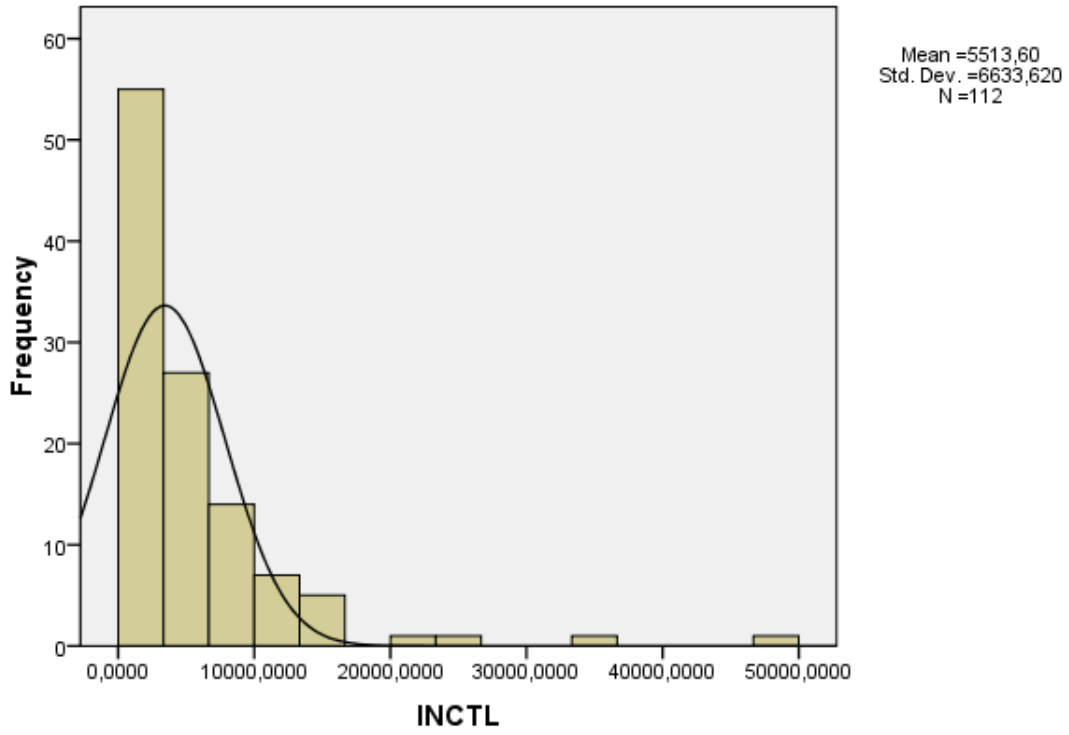


Figure 21. Histogram Showing Incomes of Tourists (TL)

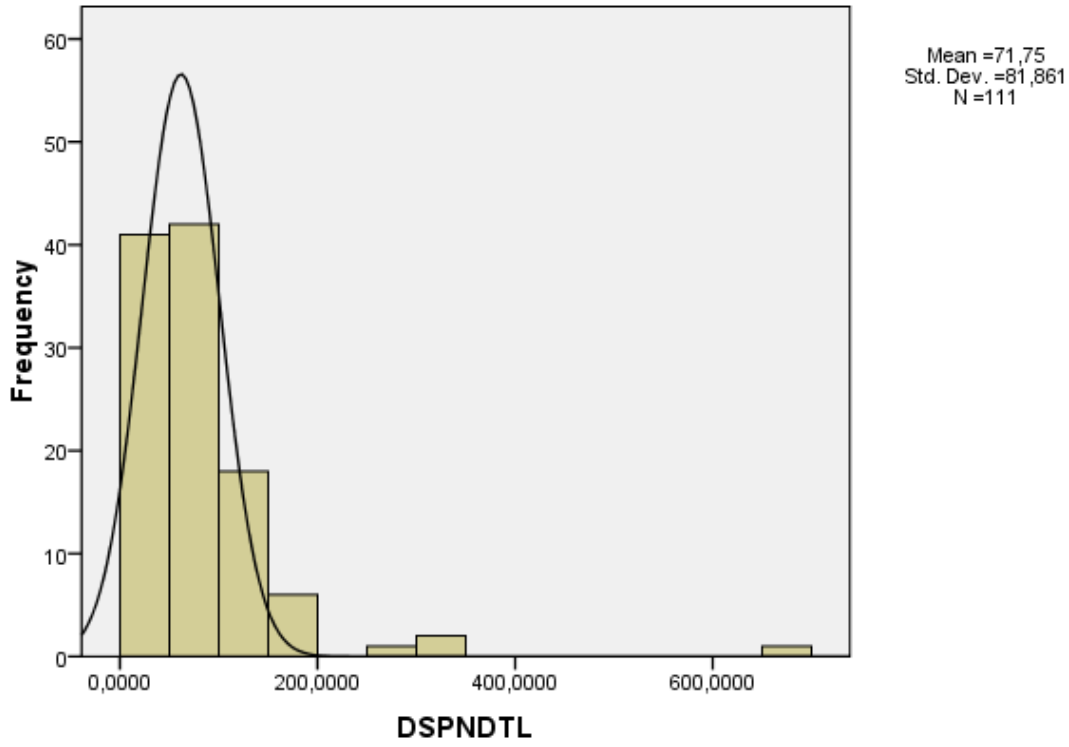


Figure 22. Histogram Showing Daily Spendings of Tourists (TL)

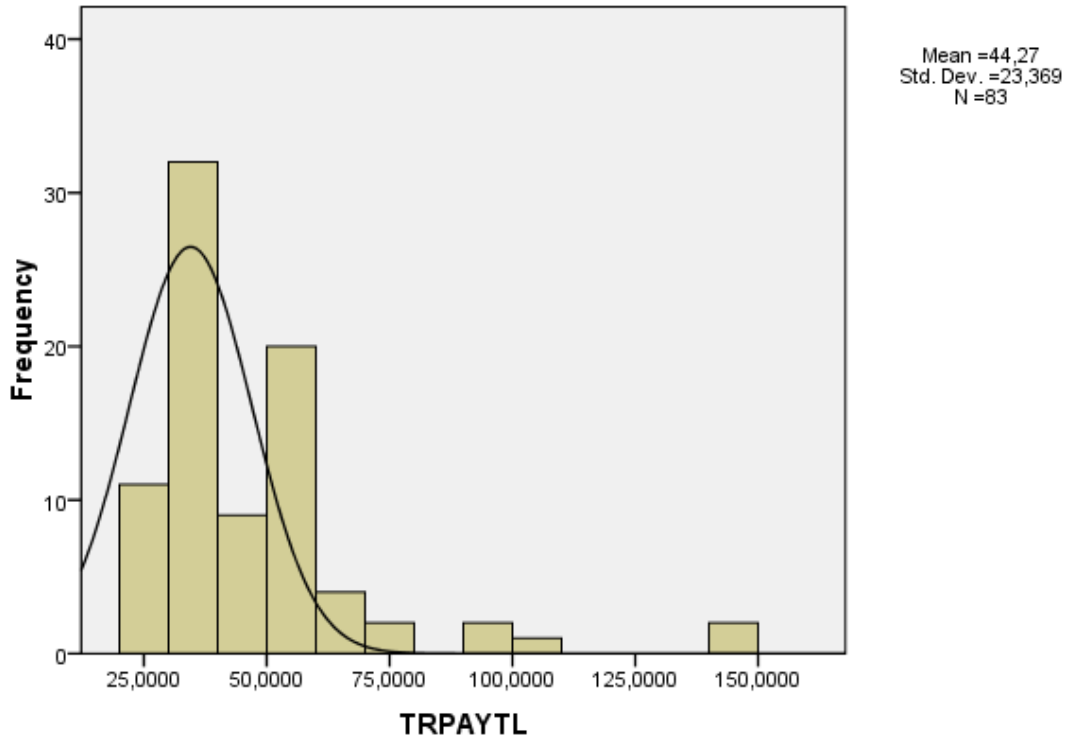


Figure 23. Histogram Showing Tour Payments of Tourists (TL)

Reasons to Stay, Activities and Payments in Göcek:

The values given in Table 12 show the selection frequency of a given variable among the respondents. Main two reasons that the respondents stated why they chose to be in Göcek are found as: (i) "The sea/nature is beautiful" option that has been selected 92% of the time and (ii) "Not crowded. I can rest well" option with 74%. Mostly done activity in the region is swimming, differing highly from other options with a value of 72%. The next following activities are attending tours with 35 % and yachting with 33%. When the respondents were asked to which activities they pay for, 41% of them told that they do not pay anything. (Activities like walking or swimming do not have any cost for them) 36% of respondents said they pay for attending tours and 14% said that they pay for yachting activities.

Table 12. Reasons to Stay, Activities and Payments in Göcek

	N	Min.	Max.	Mean	Std. Dev.
Reasons to be in Göcek					
The sea/nature is beautiful	286	0	1	.92	.278
Not crowded I can rest well	286	0	1	.74	.437
Other	286	0	1	.42	.494
Service supply is good	286	0	1	.31	.464
I can do fishing	286	0	1	.27	.446
Cheap	286	0	1	.10	.298
Activities Done in Göcek					
Swimming	286	0	1	.72	.451
Attending Tours	286	0	1	.35	.478
Yachting	286	0	1	.33	.471
Walking/Running	286	0	1	.30	.458
Sunbathing	286	0	1	.28	.451
Fishing	286	0	1	.26	.437
Other	286	0	1	.25	.433
Water Sports	286	0	1	.15	.355
Paid Activities					
None	286	0	1	.41	.493
Attending tours	286	0	1	.36	.482
Yachting	286	0	1	.14	.344
Swimming	286	0	1	.09	.293
Water sports	286	0	1	.09	.283
Other	286	0	1	.08	.272
Fishing	286	0	1	.04	.193
Sunbathing	286	0	1	.02	.144
Walking/Running	286	0	1	.00	.059

Captain and boat characteristics:

In Tables 13 and 14, results for the captain and boat characteristics statistics are given. 26% of the respondents stated that they owned a boat and 11% of the respondents were working as a captain. Boat type variable showed that 31% of the boats are wooden and 69% of the boats were made from fiber material.

The average boat length is found as 19 meters. The respondents owning a boat also answered questions more detailed about their boat use and waste/environment relationship. 40.8% of the boats have wastewater treatment units installed whereas 57.9% of them do not have a wastewater treatment unit and 51.1% of the ones that do not have a treatment unit said that they would consider installing one. When they are asked if they have the necessary wastewater transfer equipment on their boats 92.1% confirmed that they have and out of the no equipment having boat owners, only 12.5% said they would want to have those transfer equipments. The boat owners were asked about how they discharge their wastewater and 14.9% of them told that they discharge directly to sea. 41.9% give the wastewater to the collection boats and 43.2% give the wastewater to the collection stations on land. While 78% of the boat owners stated that the amount of wastewater collection boats is not enough and it should be increased. 55.3% of the boat owners stated that the amount of wastewater collection stations is not enough and should be increased. 32% of the boat owners are recycling their waste and majority of the respondents (88%) stated that they dispose of their solid waste by using waste collection stations on land. the rest are using the collection boats. No one stated that they dump solid waste into sea. 54% of the users think that the number of solid waste collection boats should be increased and 30% think the same for the collection stations on land. 19.7% of the boat owners are tying their boats by using anchors and tying to rocks and trees nearby whereas the rest are using buoys and cleats. Only 32.9% of the boat owners think that there are enough number of buoys and cleats which indicate that there's a need for an increase.

Table 13. Captain and boat characteristics (Descriptive Statistics)

	N	Min.	Max.	Mean	Std. Dev.
Owning a boat	286	0	1	.26	.441
Being a captain	286	0	1	.11	.316
Boat type	74	0	1	.31	.466
Boat length	74	1	37	19	8.60
Adequacy of wastewater collection boats	76	0	1	.22	.419
Adequacy of wastewater collection stations	76	0	1	.43	.499
Solid waste recycling	76	0	1	.32	.468
Adequacy of solid waste collection boats	76	0	1	.46	.502
Adequacy of solid waste collection stations	76	0	1	.70	.462

Table 14. Captain and boat characteristics (Frequencies)

	N	Yes (%)	No (%)	No answer/ Not Sure (%)
Having wastewater treatment unit on boat	76	40.8	57.9	1.3
Having wastewater transfer equipment on boat	76	92.1	6.6	.1.3
Wanting wastewater treatment unit	45	51.1	44.4	4.4
Wanting wastewater transfer equipment	8	12.5	87.5	-
Adequacy of buoys	76	32.9	64.5	2.6

	N	To open sea	To collection boats	To land stations
Wastewater discharge	74	14.9	41.9	43.2
Solid waste disposal	75	-	12.0	88.0

	N	Anchor	Buoys/ Cleats	
How the boat is tied	76	19.7	80.3	-

Environmental variables:

Variables showing if people are thinking there exists environmental problems and if there will exist in the future and the variable showing if they believe those problems can be avoided by awareness increasing measures all have a range of 0-2, therefore the detailed results are obtained from frequency analysis, which is given in Table 15. According to the frequency analysis 69.9% of the respondents think that there are environmental problems in Göcek and 21.7% do not think so. The remaining 8.4% stated that they are not sure. Again, a high percentage of people, 82.5%. believe that there will be environmental problems in the future and 10.8% do not believe so. 6.6% said that they do not have a certain answer for this. 64% believe that environmental problems can be avoided by awareness increasing campaigns and 24.1% do not agree on this idea. 11.9% remains unsure. From the results shown in Table 16, 14% of the

respondents were members of an environmental organization (local or international). Respondents were asked which environmental problems are the leading ones for them and mixing of wastewater with sea is the highest chosen option with 77%. Mixing of solid waste with sea followed that, being chosen 64% of the time. Decrease in population and variety of animals on sea and land was the third highest chosen option with 57%. Out of the awareness increasing measures to improve environmental conditions in Göcek, briefings that would be given to passengers on tour boats before the trip option was the mostly favored one and was selected 28% of the time. 60% of the respondents stated that they would be willing to pay for the proposed environmental improvements in Göcek.

Table 15. Environmental Variables (Frequencies)

	N	Yes (%)	No (%)	No answer/ Not Sure (%)
Whether awareness increasing would be a good measure	286	64	24.1	11.9
Whether there are environmental problems	286	69.9	21.7	8.4
Whether there will be environmental problems	286	82.5	10.8	6.6

Table 16. Environmental Variables (Descriptive Statistics)

	N	Min.	Max.	Mean	Std. Deviation
Membership to an environmental organization	286	0	1	.14	.344
Willing to pay	286	0	1	.60	.490
Environmental Problems					
Mixing of wastewater with sea	286	0	1	.77	.424
Mixing of solid waste with sea	286	0	1	.64	.481
Decrease in population and variety of animals on sea and land	286	0	1	.57	.496
Damaged seagrass, trees on land and other plants, the decrease in their population	286	0	1	.35	.478
Other	286	0	1	.17	.374

	N	Min.	Max.	Mean	Std. Deviation
Awareness increasing measures					
Briefings that would be given to passengers on tour boats, before the trip	286	0	1	.28	.448
Posters & flyers to the boats that will be staying in the marinas/sea	286	0	1	.19	.389
Other	286	0	1	.14	.351
A webpage on municipality's webpage about preventing pollution	286	0	1	.06	.243

4.2. Multinomial Logit Runs for Model Construction

While conducting the survey, respondents who said "No" to the willingness to pay question were included in the data set assuming as they chose the third scenario. Since the third scenario was the status-quo in all choice cards and it has no extra cost (Zero willingness to pay amount) associated with it, it is considered the same as not willing to pay anything.

The multinomial logit (MNL) model runs are made separately for the target groups because each had different background motivations and payment vehicles. It is seen that, not all the captains were the owners of the boats they are working in, so some lacked the necessary monetary information or the information about the characteristics of the boats and they are not the ones who would pay the actual WTP amount. This fact affects their stated choices, so the main runs included in the results are for local residents and tourists only.

Firstly, a simple model was constructed only with the alternative variables water quality, marine life and price increase. In that way, it is seen that parameters turn out to be insignificant when the limiting level of significance is chosen to be 10% and it is also seen that interaction terms are needed. Table 17 shows the results of the basic MNL run for the local residents and the insignificance of the coefficients. Even though price attribute had a significant coefficient, since water attribute is statistically not significant, a meaningful WTP calculation is not possible to make in this case.

Table 17. Basic MNL Run for Local Residents

Variable	Coefficient	Std. Error	b/std. err.	P[|Z|>z]
WTR	0.153514	.22541083	.681	.4958
MAR	0.332808	.19800911	1.681	.0928
PRC	-0.0370983	.01752729	-2.117	.0343

The reason to include interaction terms is being able to incorporate socio-economic or environmental information to the model.

After the interaction terms are created, first they are included by themselves along with main alternative variables. After selecting the significant interaction terms, other models having a combination of these variables were also run. A high number MNL models were run, and the best model describing the data is shown in Table 18. Selected sample run results are provided in Appendix A.

Table 18. MNL output for Local Residents

	COEFF.	P - VALUE	LL	Pseudo - R^2	IIA TEST P-VALUE		WTP	
VARIABLES					A is out	B is out	WATER	MARINE
WATER	0.909	0.0071						
MARINE	0.746	0.0012						
PRCINC	-0.0505	0.0352						
GW	-0.544	0.0605						
IP	0.0000178	0.0661	-323.81	0.087	0.56	0.084	17.99	14.77
DLYPRC	0.00089	0.0151						
ORGPRC	0.218	0.0006						
ASC	1.182	0.0001						

WATER: Water quality **MARINE:** Marine Life **PRCINC:** Price increase **GW:** Gender*Water Quality **IP:** Income*Price increase **DLYPRC:** Daily spendings*Price increase **ORGPRC**: Organization*Price increase **ASC:** Alternative Specific Constant

The reason for the selection of this model is based on its overall model significance, model fit and its conformity to IIA assumption. When the overall significance is considered, a log-likelihood ratio test is done and the closer the

log-likelihood (LL) value is to zero, the better the model when compared to a base model. In this case, there were other models with a value closer to zero than the selected model but they were violating the IIA assumption so they are not selected. When IIA assumption was tested, alternatives A and B are taken out (one at a time) and then the model's probability values are calculated. According to the literature and as suggested by Hensher et al. (2005), when the p-value is compared to alpha value equal to 0.05, if the p-value is smaller than 0.05 then the IIA assumption is rejected.

The results show that, the selected model does not violate the assumption and MNL model can be used. The pseudo-R^2 value is 0.087 ($\approx$ 0.1) which is a low value especially when compared to the OLS regression R^2, but since the choice analysis done with MNL is non-linear the R^2 do not mean and show the same thing as in OLS . Hensher et al. (2005) states that a value between 0.2 and 0.4 can be considered as a decent fit whereas Louviere et.al (2000) considers this range as extremely good fits. Even though the result found here is lower than 0.2, there are several cases in literature having such low values in the range 0.07-0.11, so this result is not a very rare situation. (Mazzanti 2001, Birol and Koundouri, 2008)

The alternative specific constant (ASC) is included to see the general inclination of respondents to be willing to pay. It is coded as 1 when respondents chose Alternative A or Alternative B and it is coded as 0 when no-choice alternative is selected. So a positive sign on ASC, would mean that people are more in favor of changing the current situation and they want to do something about it. In this case, ASC is statistically significant below one percent level and has a positive sign, which indicates that the respondents are favoring a change. Two of the main variables WATER and MARINE have the expected positive signs and they are both statistically significant below one percent level. The other main variable PRCINC, has a negative sign as expected and it is statistically significant at five percent level. GW and IP variables are statistically significant at ten percent level, DLYPRC is statistically significant at five percent level and the rest of the parameters are statistically significant at one percent level. The defining model for the *locals residents* found from this result is given as:

$U_{local\ residents} = \beta_0 + \beta_1$(Water Quality) + β_2(Marine Life) + β_3(Price Increase) + β_4(Gender*Water Quality) + β_5(Income*Price Increase) + β_6(Daily Spendings*Price Increase) + β_7(Environmental Organization*Price Increase) + ε

$U_{local\ residents} = 1.18 + \mathbf{0.91}$(Water Quality) + **0.75**(Marine Life) – **0.05**(Price Increase) – 0.54(Gender*Water Quality) + $0.18*10^{-4}$(Income*Price Increase) + $0.89*10^{-3}$(Daily Spendings*Price Increase) + 0.22(Environmental Organization*Price Increase) + ε

The WTP amount is calculated as mentioned in the previous sections. For example when the coefficient for the water quality attribute is divided with the negative of coefficient of price increase,

$$WTP_{local\ residents}\ (\text{for water quality}) = -\frac{\beta_{water\ quality}}{\beta_{price\ increase}} = -\frac{0.909}{-0.0505} = 18\ TL$$

The WTP for the marine life is calculated as,

$$WTP_{local\ residents}\ (\text{for marine life}) = -\frac{\beta_{marine\ life}}{\beta_{price\ increase}} = -\frac{0.746}{-0.0505} = 14.8\ TL$$

The resulting WTP values for both of the attributes are found as: 18 TL for water quality improvements and 14.8 TL for marine life improvements.

Table 19. MNL output for Tourists

	COEFF.	P-VALUE	LL	Pseudo - R^2	IIA TEST P-VALUE		WTP	
VARIABLES					**A is out**	**B is out**	**WATER**	**MARINE**
WATER	1.081	0.0001	-357.94	0.044	0.293	0.712	16.6	11.15
MARINE	0.725	0.0006						
PRCINC	-0.065	0.0249						
AP	0.0015	0.0037						
GW	-0.44	0.0655						
ASC	1.097	0.0002						

WATER: Water quality **MARINE:** Marine Life **PRCINC:** Price increase **AP:** Age*Price increase **GW:** Gender*Water Quality
ASC: Alternative Specific Constant

The MNL model results for the tourists is given in Table 19. The significant variables for this model are found as WATER, MARINE, AP and ASC with significance levels below one percent, GW with significance level below ten percent and PRCINC with a significance level below five percent. The main variables have the expected signs and the positive sign on ASC gives the same outcome as in local residents' case. Tourists are also in favor of a change of the current environmental situation of Göcek. Hausman Test for checking the IIA assumption showed that there is no violation of the assumption and MNL model can be used. The pseudo-R^2 of the model is 0.044, which is also a low number but it is still acceptable because of the reasons mentioned in the local residents' case.

The resulting model for the tourist is given as:

$U_{tourists} = \beta_0 + \beta_1(\text{Water Quality}) + \beta_2(\text{Marine Life}) + \beta_3(\text{Price Increase}) + \beta_4(\text{Age*Price Increase}) + \beta_5(\text{Gender*Water Quality}) + \varepsilon$

$U_{tourists} = 1.1 + \mathbf{1.08}(\text{Water Quality}) + \mathbf{0.72}(\text{Marine Life}) - \mathbf{0.06}(\text{Price Increase}) + 0.002(\text{Age*Price increase}) - 0.44\ (\text{Gender*Water Quality}) + \varepsilon$

The WTP amount for the water quality attribute is calculated as,

$$WTP_{tourists}(\text{for water quality}) = -\frac{\beta_{water\ quality}}{\beta_{price\ increase}} = -\frac{1.081}{-0.065} = 16.6\ TL$$

The WTP amount for the marine life attribute is calculated as,

$$WTP_{tourists}(\text{for marine life}) = -\frac{\beta_{marine\ life}}{\beta_{price\ increase}} = -\frac{0.725}{-0.065} = 11.2\ TL$$

It is calculated that tourist are willing to pay an increase of 16.6 TL/tour fee for the improvements for water quality parameters and 11.2 TL/tour fee for the improvements in marine life. The reason of the difference between the amounts paid for water quality and marine life improvements is probably because the tourists are using Göcek as a vacation area so they are more concerned about

the water quality rather than the marine life (habitat protection in this case). They chose to pay more for the water quality because they are swimming in the sea and also visually enjoying it, so a decrease in the quality of the sea environment would affect their willingness to come to Göcek.

4.3. Calculation of Costs of the Proposed Environmental Improvements

Since most of the respondents are willing to pay for environmental improvements and the WTP amounts are generously stated when the payment vehicles are considered, some monetary evaluation is made about the proposed changes. As stated before, there are 1094 boats in use in Göcek and Fethiye bays and the carrying capacity of the bays is 1111 boats. For the improvements to protect and sustain marine life, the proposed changes was constructing and installing new buoys and cleats, so that the boat owners do not use anchors or they do now tie the boats to trees and rocks around. As for the improvements for water quality, the results also support the offer of buying more collection boats for wastewater and solid waste. The most general improvement suggested was the awareness increasing campaigns which include putting posters and flyers to boats or radio and TV campaigns. Although there are NGOs present, investments will be mainly paid by the municipality since the choice cards asked for an increase in monthly water bills and this should be reflected with governmental procedures.

There are currently 1 boat working for the collection of wastewater and 1 boat for the collection of solid waste although there are 2 boats for each type of waste. Considering the amount of boats in the bay and the current low number of collection boats, the need of new ones is apparent. In the previous studies about Göcek, The amount of wastewater from the boats is calculated to be approximately 400 m^3/day (METU, 2007). A 15m long wastewater collection boat can hold a wastewater amount of approximately 15 m^3/day (Yalçıner A.C., Personal communication, January 2012). So, if half of the wastewater produced is to be collected by boats;

200 m^3/day / 15 m^3/day = 13.3 boats

would be needed. So, it can be said that minimum 10 – 15 new boats should be bought. Each wastewater collection boat costs around 120,000 TL (Yalçıner A.C., Personal communication, January 2012), so for 12 new boats (considering the 2 available boats will also be used, so there will be a total of 14 boats) 1,560,000 TL would be needed.

For the collection of solid waste, it is found out that boat owners tend to use the land based collection stations more, but still there's a need for new solid waste collection boats. From the previous studies the daily solid waste amount is found as 4 tons/day (METU, 2007). Considering a boat can collect an average of 1 ton of solid waste, a total of 4 boats are needed. There are 2 boats present already so only 2 new boats should be bought. Their costs are stated as ranging between 60,000 – 100,000 TL, so if we use the average values of 80,000 TL per boat, an investment of 160,000 TL is needed for the new solid waste collection boats (Yalçıner A.C., Personal communication, January 2012). For the total investment needed to improve/sustain the water quality;

1,560,000 TL + 160,000 TL = 1,720,000 TL would be needed.

The amount of buoys and cleats currently present in Göcek bay is around 250. The meetings with the researchers and governmental and non-governmental stakeholders concluded that there should not be more than 500 boats in Göcek daily. So considering the current number of buoys and cleats, there should be a construction of at least 200-250 more buoys. According to the main buoy producers in Göcek, a buoy costs 10,000 TL and a cleat costs 5000 TL, so in total they cost 15,000 TL. So for 250 more buoy and cleat combination

250 x 15,000 TL = 3,750,000 TL

is needed. The yearly maintenance cost is 50,000 TL. So the total investments needed are a one-time payment of 3,750,000 TL and after that, 50,000 TL yearly.

The awareness increasing campaigns are told to cost approximately 100,000 TL per year including TV and radio campaigns, posters, website construction and employee salaries. (Yalçıner A.C., Personal communication, January 2012). The summary of the investment costs can be found in Table 20.

Table 20. Summary of Investment Costs

Improvements	Costs
New collection boats	1,720,000 TL
New buoys/Cleats	3,750,000 TL
Maintenance of buoys/cleats	50,000 TL / year
Awareness increasing campaigns	100,000 TL / year

With the WTP amounts obtained from the local residents and tourists, a comparison can be made. The population of Göcek is 4039 people, which can be used for the whole population for local residents. Assuming a household includes 3 people (EPASA,2010), 4039/3 ≈ 1346 household is present in the region. It is stated that the population of Göcek doubles in summer months so whole tourist population is taken as 4000 people (EPASA, 2010). Also, Tourists are assumed to attend to tours 2 times per trip, and they are assumed to have one trip to Göcek in a year. The calculations are based on these assumptions and results are given in Table 21.

Table 21. Aggregation of WTP

	WATER QUALITY	MARINE LIFE
LOCAL RESIDENTS	17.99 TL/month/household*1346 households* 12 months/year = **290,575** TL / year	14.77 TL/month/household*1346 households *12 months/year = **238,565** TL/year
TOURISTS	16.6 TL/tour/person* 2 tours/trip*trip/year * 4000 people= **132,800** TL/year	11.15 TL/tour/person2 tours/trip*trip/year * 4000 people= **89,200** TL/year
TOTAL	**423,375 TL/year**	**327,765 TL/year**

The total needed investment costs can be separated into cost for one-time investment and yearly needed costs and can be calculated as following;

One time investment:

1,720,000 TL + 3,750,000 TL = 5,470,000 TL , for new boats and new buoys/cleats

Yearly needed costs:

50,000 TL + 100,000 TL = 150,000 TL, for maintenance of buoys/cleats and for awareness increasing campaigns.

The total amount that can be obtained yearly from the stakeholders of Göcek (residents and tourists only) is,

423,375 TL/year + 327,765 TL/year = 751,140 TL/year

4.4. Cost-Benefit Analysis

Cost Benefit Analysis (CBA) is commonly used in decision making processes. It aims to be able to decide whether a project should be run or it helps the decision maker to select one alternative from several other alternatives. While doing this the unit is money, but of course this monetary amount relies on utilities (Hanley and Barbier, 2009). Since choice experiments are highly capable of defining the utilities and valuing the environment in monetary terms, a follow- up analysis such as CBA would be beneficial. The aggregated willingness to pay amounts show the benefits that can be obtained from the implementation of the proposed improvements, so the valuation of environmental goods come into the decision making process with this analysis.

In this study, amount of benefits is calculated without the inclusion of boat owners and captains, but if they are to be obtained and included, the actual amount would be more than stated. For the comparison of costs and benefits, the WTP amounts of local residents and tourists will be used.

Since the monetary values do not stay the same for every period of time, an equivalent amount should be obtained for the present time and the future. So,

the time value of the money and the interest rate should be known (Blank and Tarquin,1998). In this study, the costs and benefits are defined in annual terms, so to find the future worth in yearly periods, costs are needed to be converted to annual terms using an interest rate.

To find the annual worth, knowing the present worth of the money, Equation 28 is used:

$$AW = PW\left[\frac{i(1+i)^n}{(1+i)^n-1}\right] \quad (28)$$

Where

AW: Annual Worth, **PW:** Present Worth, **i:** Interest rate, **n:** Interest period.

As the investment costs, values in Table 20 and as the benefit amounts, values in Table 21 are used. The interest rate is used as the average of the last two years' inflation rate for Turkey. The trend for the last ten years of the inflation rate can be seen in Figure 24.

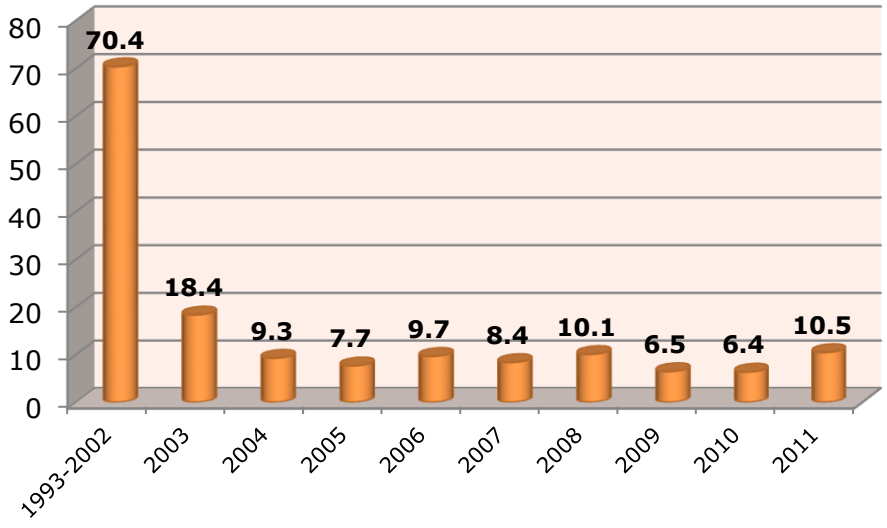


Figure 24. Inflation Rates With Respect to Years – Turkey (%)

It can be seen that after year 2003, the range for the inflation rate is 6.4% - 10.5%. The average of the years 2010 and 2011 is found as,

Average inflation rate = $\frac{6.4\%+10.5\%}{2}$ = 8.45 %

The guidelines given by Blank and Tarquin (1998) is used for the decision of the proposed investments, in a benefit-cost analysis approach. Maintenance and campaign costs and benefits are in annual terms already, so only the capital costs are needed to be annualized. This is done by using Equation 28, such that, for an interest rate of 8.45% and interest period of 10 years:

$$AW = 5{,}740{,}000\left[\frac{0{,}0845(1+0{,}0845)^{10}}{(1+0{,}0845)^{10}-1}\right] = 872{,}872 \text{ TL}$$

Microsoft Office Excel's payment function (PMT) is used to calculate the annualized worths for the rest of the trials, by looking at different interest periods. The summary table for these trials are given in Table 22.

Table 22. Summary for Benefit-Cost Analysis Calculations

	Interest Period (Years)				
	10	**15**	**20**	**21**	**25**
Capital Cost Annualized (TL)	-872,872	-689,140	-604,345	-592,979	-558,534
Maintanence Costs Annual (TL)	-150,000	-150,000	-150,000	-150,000	-150,000
Benefits (WTP) Annual (TL)	751,140	751,140	751,140	751,140	751,140
Total Annual Costs (TL)	-1,022,872	-839,140	-754,345	-742,979	-708,534
Total Annual Benefits (TL)	751,140	751,140	751,140	751,140	751,140
Benefits - Costs (TL)	-271,732	-88,000	-3,205	**8,161**	42,606

When the difference between benefits and costs is positive, it can be concluded that the proposed project is feasible. In this study, the payback period is calculated to be 21 years, since the first positive value is obtained in the 21st year.

CHAPTER V

CONCLUSIONS

Non-market valuation of environmental amenities is extensively studied in the recent years. Global problems like climate change, marine pollution and flora/fauna loss has lead researchers to look for more strict yet applicable environmental policies. In this study, an application of a choice experiment is presented to aid decision makers in creation of new policies and regulations to overcome the environmental problems in Göcek.

Göcek is a highly popular region in yacht tourism and it is suffering from the improper use of its marine environment. Improving the sea water quality along with protecting and sustaining marine life are necessary measures to stop the worsening conditions. The aim of the study was to calculate the willingness to pay (WTP) amounts of the users and this is done by using choice experiment surveys. The surveys are conducted with 3 groups of stakeholders of Göcek and their general views on the situation are analyzed together with determining a monetary value of the environmental improvements. The surveys are conducted in the end of August 2010 to the beginning of September 2010 and 286 usable surveys were obtained for analysis.

The results clearly showed that people using Göcek are highly aware of the problems and they want to do something to change the situation. This is because a high amount of the respondents stated that they would be willing to pay for the changes. Local residents are willing to pay 18 TL/month for improvements in water quality and 14.8 TL/month for improvements in marine life. Whereas these values are 16.6 TL/tour and 11.2 TL/tour for tourists. It has been seen that with these amounts, the payback time of the investments would be 21 years.

This study was the first example of a choice experiment application in Turkey and therefore it is an important step for future research. There are several

issues that were of concern during the design, implementation and analysis of the surveys. First of all, separating the target groups created a difficulty both in the design and analysis stages. One of the target populations was boat owners and during the survey it has been seen that not all of them owned the boats they were using. But willing to pay amounts should be obtained from the boat owners due to the nature of the survey design. In this case, captains could choose high price increases without any concern because they would not be the one who is actually going to pay. This fact caused the exclusion of captains as one target group from the main analysis, causing a loss of data which probably reduced the consistency of the results. Nonetheless, the other two target populations still gave a good amount of information. Even the frequency analyses showed valuable thoughts and views of the respondents. But of course, when a choice experiment is done, it would be better to have a one type of target population or if separate groups are going to be analyzed, the number of the surveys should be increased.

Also, during the design stage of choice cards, the focus group study should have been made with more number of people. Care for this step should be given in the future studies if a more thorough analysis is sought. Since the number of people was low, this reflected itself in the ranges of stated price increases. Those prices are used in the creation of the main survey scenarios and analysis and studies done with other researchers revealed a question about whether the used price increase ranges were not high enough. When the prices are lower than the values that the people would really pay, then when respondents are faced with the choice cards, they do not place any importance to the price attribute. This comes up as a problem in the analysis stage of the data, creating difficulties in WTP calculation.

When the survey is done, only the respondents saying yes to the WTP question faced the choice cards. But every respondent should have faced the choice cards so that a better number of data could be obtained. Every choice card had the scenario 3 as the status quo option, with no price increase. So, when respondents stated they are not willing to pay, they are assumed as choosing scenario 3 each time. With this assumption, a more reliable model analysis could have been made. So it turned out that there is no need of a question asking whether the respondents are willing to pay or not. All of them should

rather be faced with the choice cards, which will also indicate if or how much they are willing to pay.

The attributes and levels in the choice cards were found out to be difficult to understand by the respondents. Since there were only two levels and since they are stated qualitatively rather than quantitatively, people could not identify the differences in each alternative easily. It would be better if there were more levels, leading to more numbers of different alternatives, and that these levels were stated quantitatively like percentages or numbers. This will ease the conduction of the survey both for the interviewer and the respondent.

The survey is conducted in the central parts of the town but it would be beneficial if they have been conducted also in the outer districts of the town, especially where the local people were living. The main reason for the survey is done in the central parts and marinas is that two of the target populations, tourists and boat owners, were usually located in those locations and it was easier to find respondents. But, this may have affected the stated income or daily spendings of the people because the town center had more tourism activities and people tend to spend more in such regions. Also, some of the local residents were the shop owners in the town center so they sometimes chose to state the expenditures of their stores or restaurants instead of their houses, which would cause a raised value in some variables such as water bills.

Future studies may include conduction of the surveys in the winter season as well. In this way, the differences between the target groups may be evaluated in a more detailed manner. Since the user groups and activities change in winter months, this would be reflected in the answers of the respondents. Of course, the survey should be modified to fit the environmental conditions in winter time. Another interesting study can be suggested as an off-site survey conduction in addition to the applied on-site conduction. This survey is only applied in Göcek, but since this region has high national (also international) values due to the fact that it is a specially protected area the survey can also be conducted in other regions far from Göcek. To do this, a profound background research would be needed such as finding out the cities that the most interested parties live, or where most local tourists travel to Göcek. Then the outcomes of the on-site and off-site surveys can be compared. Surveys conducted in different times and in different locations may affect the possible payback time of the investments

which would affect the decision making process in turn. Another improvement can be made with conducting the surveys with different interviewers than before so in this way, interviewer biases can be observed and eliminated.

Frequency analysis showed that the portion of male respondents is much higher than the female ones. This was an expected result considering the conduction area's main population, but in the analyses this may have brought a gender bias. The defining models have interaction terms including multiplication with the gender variable so results may have been affected by this dominance.

The results may bring some uncertainties due the assumptions to calculate WTP, improvement costs and aggregated WTP. The uncertainties could arise from the following items:

- Low sample size due to separate target groups. (With low numbers of data, results may indicate a broader range of estimates.)
- The capacities and costs of solid waste and wastewater collection boats and costs of awareness increasing campaigns.
- The number of the times a tourist visit Göcek and the number of times he/she attends to tours per trip.
- Using values from 2010 for the number of boats using the bays.
- Interviewer biases.
- Respondent biases.

The findings suggest that this project has a potential for implementation. The stakeholders (Local residents, tourists, captains, boat owners, municipality, governmental divisions such as GDNAP, NGOs and companies working in/for Göcek) would benefit from all the suggested investments and the investors will get their money in 21 years. The main investors for these improvements will be Municipality, getting the funds from government divisions (GDNAP) and NGOS. (Turmepa)

The level of accuracies of studies and models affect the decision making process. When the accuracy is low, the studies can only be used for knowledge gaining. For screening and policy creation higher levels of accuracy is needed. A detailed cost-benefit analysis on the other hand, requires the highest level of accuracy among others. This issue is summarized in Figure 25.

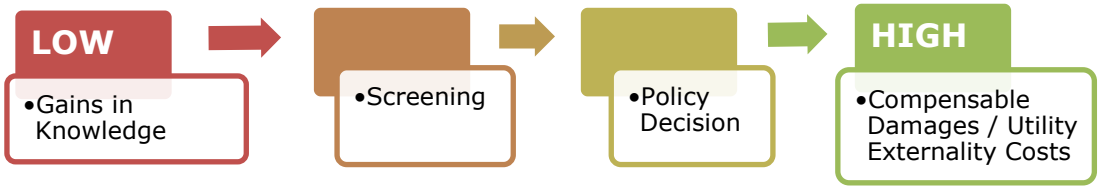


Figure 25. Required Accuracy

Even though it is found out that improvements could have been made in the survey design and application, the surveys yielded valuable results. The numerical values yielded relatively low values for model fit (Pseudo-R^2) although they are not out of the ranges obtained in the literature. But to arrive to a final conclusion about the use of the results, uncertainty analyses should be made. This study calculated the mean willingness to pay amounts of respondents but if confidence intervals are calculated, accuracy of the outcomes can be judged more precisely to be used in the decision making process as shown in Figure 25.

REFERENCES

Adaman, F., Karalı, N., Kumbaroğlu, G., Or, İ., Özkaynak, B., and Zenginobuz, Ü. (2011). "What determines urban households' willingness to pay for CO2 emission reductions in Turkey: A contingent valuation survey." Energy Policy, 39(2), 689-698.

Atkins, J. P., Burdon, D., and Allen, J. H. (2007). "An application of contingent valuation and decision tree analysis to water quality improvements." Marine pollution bulletin, 55(10-12), 591-602.

Bateman, I. J., Carson, R. T., Day, B., Hanemann, N., Hett, T., Hanley, N., Jones-Lee, M., Loomes, G., Mourato, S., and Özdemiroğlu, E. (2004). Economic Valuation with Stated Preference Techniques: A Manual. Edward Elgar Publishing.

Birol, E., and Koundouri, P. (2008). Choice experiments informing environmental policy : a European perspective. Edward Elgar Publishing.

Birol, E., Karousakis, K., and Koundouri, P. (2006). "Using economic valuation techniques to inform water resources management: a survey and critical appraisal of available techniques and an application." The Science of the total environment, 365(1-3), 105-22.

Blank, L.T., Tarquin A.J. (1998). "Engineering Economy" 4th ed. McGraw-Hill Series.

Brouwer, R. (2008). "The potential role of stated preference methods in the Water Framework Directive to assess disproportionate costs." Journal of Environmental Planning and Management, 51(5), 597-614.

Chau, C. K., Tse, M. S., and Chung, K. Y. (2010). "A choice experiment to estimate the effect of green experience on preferences and willingness-to-pay for green building attributes." Building and Environment, Elsevier Ltd, 45(11), 2553-2561.

David, G., Leopold, M., Dumas, P. S., Ferraris, J., Herrenschmidt, J. B., and Fontenelle, G. (2010). "Integrated coastal zone management perspectives to ensure the sustainability of coral reefs in New Caledonia." Marine pollution bulletin, Elsevier Ltd, 61(7-12), 323-34.

Del Saz-Salazar, S., Hernández-Sancho, F., and Sala-Garrido, R. (2009). "The social benefits of restoring water quality in the context of the Water Framework Directive: A comparison of willingness to pay and willingness to accept." The Science of the total environment, Elsevier B.V., 407(16), 4574-83.

Econometric Software, Inc. (2009). "NLOGIT Version 4.0" Econometric Software, Inc. http://www.limdep.com/products/nlogit/

Edwards, P. (2009). "Sustainable financing for ocean and coastal management in Jamaica: The potential for revenues from tourist user fees." Marine Policy, 33(2), 376-385.

EEA (2006). "EEA Report No 6/2006, The changing faces of Europe's coastal areas."

Eggert, H., and Olsson, B. (2009). "Valuing multi-attribute marine water quality." Marine Policy, 33(2), 201-206.

EPASA (2010). "Fethiye-Göcek Specially Protected Area, Research of Socio-economic, historical and cultural values project" Environmental Protection Agency for Special Areas.

European Commission (2001). "EU Focus on Coastal Zones - Turning the tide for Europe's coastal zones."

European Commission, Issue Number 38/2010. "Portrait of EU Coastal Regions."

European Commission, Issue Number 47/2009. "First demographic estimates for 2009."

European Parliament and Council (2000). "Directive 2000/60/EC of the European Parliament and of the Council, establishing a framework for Community action in the field of water policy, Water Framework Directive (WFD)."

European Parliament and Council (2002). "Recommendation of the European Parliament and of the Council, concerning the implementation of Integrated Coastal Zone Management in Europe."

Falaleeva, M., O'Mahony, C., Gray, S., Desmond, M., Gault, J., and Cummins, V. (2011). "Towards climate adaptation and coastal governance in Ireland: Integrated architecture for effective management?" Marine Policy, Elsevier, 35(6), 784-793.

Fleischer, A. (2011). "A room with a view—A valuation of the Mediterranean Sea view." Tourism Management, Elsevier Ltd, 33(3), 598-602.

GDNAP (2011) "General Directorate of Natural Assets Protection" http://www.ozelcevre.gov.tr/ENG/Anasayfa.html

González-Riancho, P., Sanò, M., Medina, R., García-Aguilar, O., and Areizaga, J. (2009). "A contribution to the implementation of ICZM in the Mediterranean developing countries." Ocean & Coastal Management, 52(11), 545-558.

Gopalakrishnan, S., Smith, M. D., Slott, J. M., and Murray, a. B. (2011). "The value of disappearing beaches: A hedonic pricing model with endogenous beach width." Journal of Environmental Economics and Management, Elsevier, 61(3), 297-310.

Grafton, R. Q., Adamowicz, W., Ddupont, D., Nelson, H., Hill, R. J., and Renzetti, S. (2004). The economics of the environment and natural resources. Blackwell Publishing.

Gu, M., and Wong, P. (2008). "Coastal zone management focusing on coastal tourism in a transitional period of China." Ocean & Coastal Management, 51(1), 1-24.

Gujarati, D. N. (2004). Basic Econometrics. The McGraw−Hill Companies.

Gürlük, S., and Rehber, E. (2008). "A travel cost study to estimate recreational value for a bird refuge at Lake Manyas, Turkey." Journal of environmental management, 88(4), 1350-60.

Hamilton, J. M. (2007). "Coastal landscape and the hedonic price of accommodation." Ecological Economics, 62(3-4), 594-602.

Han, S., Kwak, S., and Yoo, S. (2008). "Valuing environmental impacts of large dam construction in Korea: An application of choice experiments." Environmental Impact Assessment Review, 28(4-5), 256-266.

Hanley, N., Adamowicz, W., and Wright, R. (2005). "Price vector effects in choice experiments: an empirical test." Resource and Energy Economics, 27(3), 227-234.

Hanley, N., Barbier E. B. (2009) "Pricing Nature - Cost–Benefit Analysis and Environmental Policy" Edward Elgar Publishing.

Hanley, N., Mourato, S., and Wright, R. E. (2001). "Choice Modelling Approaches: A Superior Alternative for Environmental Valuation." Journal of Economic Surveys, 15(3), 435-462.

Hanley, N., Wright, R. E., and Alvarez-Farizo, B. (2006). "Estimating the economic value of improvements in river ecology using choice experiments: an application to the water framework directive." Journal of environmental management, 78(2), 183-93.

Harris, B. K., and Probert, E. J. (2009). "Waste minimisation at a Welsh university: A viability study using choice modelling." Resources, Conservation and Recycling, 53(5), 269-275.

Hearne, R. R., and Salinas, Z. M. (2002). "The use of choice experiments in the analysis of tourist preferences for ecotourism development in Costa Rica." Journal of Environmental Management, 65(2), 153-163.

Hensher, D. A., Rose, J. M., and Greene, W. H. (2008). Applied Choice Analysis: A Primer. Cambridge University Press.

Hidrue, M. K., Parsons, G. R., Kempton, W., and Gardner, M. P. (2011). "Willingness to pay for electric vehicles and their attributes." Resource and Energy Economics, Elsevier B.V.

Hoyos, D. (2010). "The state of the art of environmental valuation with discrete choice experiments." Ecological Economics, Elsevier B.V., 69(8), 1595-1603.

IMO (1973/1978). "MARPOL 73/78, International Convention for the Prevention of Pollution From Ships."

Jim, C. Y., and Chen, W. Y. (2009). "Value of scenic views: Hedonic assessment of private housing in Hong Kong." Landscape and Urban Planning, 91(4), 226-234.

Jones, N., Sophoulis, C., and Malesios, C. (2008). "Economic valuation of coastal water quality and protest responses: A case study in Mitilini, Greece." Journal of Socio-Economics, 37(6), 2478-2491.

Jones, N., Sophoulis, C., and Malesios, C. (2008). "Economic valuation of coastal water quality and protest responses: A case study in Mitilini, Greece." Journal of Socio-Economics, 37(6), 2478-2491.

Juutinen, A., Mitani, Y., Mäntymaa, E., Shoji, Y., Siikamäki, P., and Svento, R. (2011). "Combining ecological and recreational aspects in national park management: A choice experiment application." Ecological Economics, Elsevier B.V., 70(6), 1231-1239.

Kataria, M. (2009). "Willingness to pay for environmental improvements in hydropower regulated rivers." Energy Economics, Elsevier B.V., 31(1), 69-76.

Kontogianni, A., and Langford, I. A. N. H. (2003). "Social Preferences for Improving Water Quality : An Economic Analysis of Benefits from Wastewater Treatment." Water Resources Management, 317-336.

Koop, G. (2008). Introduction to econometrics. Wiley.

Koundouri, P. (2009). The use of economic valuation in environmental policy : providing research support for the implementation of EU water policy under AquaStress. New York : Routledge.

Koutrakis, E., Sapounidis, a., Marzetti, S., Marin, V., Roussel, S., Martino, S., Fabiano, M., Paoli, C., Rey-Valette, H., Povh, D., and Malvárez, C. G. (2011). "ICZM and coastal defence perception by beach users: Lessons from the Mediterranean coastal area." Ocean & Coastal Management, Elsevier Ltd, 54(11), 821-830.

Lancaster, K. (1966). "A New Approach to Consumer Theory." Journal of Political Economy, 74, 132-157.

Lee, C., and W. Mjelde, J. (2007). "Valuation of ecotourism resources using a contingent valuation method: The case of the Korean DMZ." Ecological Economics, 63(2-3), 511-520.

Lee, J. (2009). "Measuring the environmental costs of tidal power plant construction: A choice experiment study." Energy Policy, Elsevier, 37(12), 5069-5074.

Liu, X., and Wirtz, K. W. (2010). "Managing coastal area resources by stated choice experiments." Estuarine, Coastal and Shelf Science, Elsevier Ltd, 86(3), 512-517.

Longo, a, Markandya, a, and Petrucci, M. (2008). "The internalization of externalities in the production of electricity: Willingness to pay for the attributes of a policy for renewable energy☆." Ecological Economics, 67(1), 140-152.

Louviere, J. J., Hensher, D. A., and Swait, J. D. (2000). Stated Choice Methods Analysis and Applications. Cambridge University Press.

Mazzanti M. (2001). "Discrete Choice Models and Valuation Experiments - An Application to Cultural Heritage" University of Ferrara.

Michalena, E., Hills, J., and Amat, J.-P. (2009). "Developing sustainable tourism, using a multicriteria analysis on renewable energy in Mediterranean Islands." Energy for Sustainable Development, Elsevier Inc., 13(2), 129-136.

McFadden, D. (1974). "Conditional Logit Analysis of Qualitative Choice Behavior." Frontiers in Econometrics, P. Zarembka, ed., Academic Press, 105-142.

Nunes, P., and Blaeij, A. (2005). Economic Assessment of Marine Quality Benefits: Applying the Use of Non-Market Valuation Methods. Springer Netherlands.

O'Hagan, a. M., and Ballinger, R. C. (2010). "Implementing Integrated Coastal Zone Management in a national policy vacuum: Local case studies from Ireland." Ocean & Coastal Management, Elsevier Ltd, 53(12), 750-759.

Ojeda, M., Mayer, a, and Solomon, B. (2008). "Economic valuation of environmental services sustained by water flows in the Yaqui River Delta." Ecological Economics, 65(1), 155-166.

Pampel, F. (2000). Logistic Regression A Primer. Sage Publications.

Powe, N. A. (2007). Redesigning environmental valuation : mixing methods within stated preference techniques. Edward Elgar Publishing.

Rambonilaza, M., and Dacharybernard, J. (2007). "Land-use planning and public preferences: What can we learn from choice experiment method?" Landscape and Urban Planning, 83(4), 318-326.

Reis, J., and Lowe, C. (2012). "Capacity development of European coastal and marine management – gaps and bridges." Ocean & Coastal Management, Elsevier Ltd, 55, 13-19.

Remoundou, K., Koundouri, P., Kontogianni, A., Nunes, P. a. L. D., and Skourtos, M. (2009). "Valuation of natural marine ecosystems: an economic perspective." Environmental Science & Policy, 12(7), 1040-1051.

Rolfe, J. (2000). "Choice modelling and its potential application to tropical rainforest preservation." Ecological Economics, 35(2), 289-302.

Rosen, S. (1974). "Hedonic Prices and Implicit Markets: Product Differentiation in Pure Competition." Journal of Political Economy, 82(1), 34.

Ryan, M., Gerard, K., and Amaya-amaya, M. (2008). Using Discrete Choice Experiments to Value Health and Health Care. Springer Netherlands.

Sander, H. a., and Polasky, S. (2009). "The value of views and open space: Estimates from a hedonic pricing model for Ramsey County, Minnesota, USA." Land Use Policy, 26(3), 837-845.

Smyth, R. L., Watzin, M. C., and Manning, R. E. (2009). "Investigating public preferences for managing Lake Champlain using a choice experiment." Journal of environmental management, Elsevier Ltd, 90(1), 615-23.

Snowball, J. D. (2008). Measuring the Value of Culture Methods and Examples in Cultural Economics. Springer Berlin Heidelberg.

Söderqvist, T., Eggert, H., Olsson, B., and Soutukorva, Å. (2005). "Economic Valuation for Sustainable Development in the Swedish Coastal Zone." Sustainable Coastal Zone Management, 34(2), 169-175.

Stahl, R. G. Jr., Kapustka, L. A., Munns, W. R. Jr., and Bruins, R. J. F. (2007). Valuation of Ecological Resources: Integration of Ecology and Socioeconomics in Environmental Decision Making. CRC Press.

Thurston, H. W., Heberling, M. T., and Schrecongost, A. (2009). Environmental Economics for Watershed Restoration. Taylor & Francis Group, LLC.

UNCED, 1992, "United Nations Conference on Environment and Development."

UNEP (1976). "Barcelona Convention, Convention for the Protection of the Mediterranean Sea Against Pollution."

UNEP/MAP (2008). "The protocol on integrated coastal zone management in the Mediterranean"

UNEP/MAP (2009). "UNEP/MAP-Plan Bleu: State of the environment and development In the Mediterranean"

Vesterinen, J., Pouta, E., Huhtala, a, and Neuvonen, M. (2010). "Impacts of changes in water quality on recreation behavior and benefits in Finland." Journal of environmental management, Elsevier Ltd, 91(4), 984-94.

Waltert, F., and Schläpfer, F. (2010). "Landscape amenities and local development: A review of migration, regional economic and hedonic pricing studies." Ecological Economics, Elsevier B.V., 70(2), 141-152.

Wattage, P., Mardle, S., and Pascoe, S. (2005). "Evaluation of the importance of fisheries management objectives using choice-experiments." Ecological Economics, 55(1), 85-95.

Wielgus, J., Gerber, L. R., Sala, E., and Bennett, J. (2009). "Including risk in stated-preference economic valuations: Experiments on choices for marine recreation." Journal of environmental management, Elsevier Ltd, 90(11), 3401-9.

METU (2007). "Determination of Marine Vehicles Carrying Capacity of Fethiye GÖcek Special Environmental Protection Area" METU, Department of Civil Engineering,Ocean Engineering Research Center

Zhai, G., and Suzuki, T. (2008). "Public willingness to pay for environmental management, risk reduction and economic development: Evidence from Tianjin, China." China Economic Review, Elsevier Inc., 19(4), 551-566.

Zoppi, C. (2007). "A multicriteria-contingent valuation analysis concerning a coastal area of Sardinia, Italy." Land Use Policy, 24(2), 322-337.

APPENDIX A

RESULTS FOR MNL RUNS – LOCAL RESIDENTS

GW + EP + ASC:

Gender*Water Quality + Education*Price Increase + Alternative Specific Constant

```
+---------------------------------------------+
| Discrete choice and multinomial logit models|
+---------------------------------------------+
Normal exit from iterations. Exit status=0.
+---------------------------------------------+
| Discrete choice (multinomial logit) model   |
| Maximum Likelihood Estimates                |
| Model estimated: Jan 24, 2012 at 11:19:10PM.|
| Dependent variable               Choice     |
| Weighting variable                 None     |
| Number of observations              333     |
| Iterations completed                  5     |
| Log likelihood function       -321.1207     |
| Number of parameters                  6     |
| Info. Criterion: AIC =          1.96469     |
|   Finite Sample: AIC =          1.96546     |
| Info. Criterion: BIC =          2.03330     |
| Info. Criterion:HQIC =          1.99205     |
| R2=1-LogL/LogL*  Log-L fncn  R-sqrd  RsqAdj |
| Constants only    -354.7201  .09472  .08649 |
| Response data are given as ind. choice.     |
| Number of obs.=   333, skipped   0 bad obs. |
+---------------------------------------------+

+---------------------------------------------+
| Notes No coefficients=> P(i,j)=1/J(i).      |
|       Constants only => P(i,j) uses ASCs    |
|         only. N(j)/N if fixed choice set.   |
|         N(j) = total sample frequency for j |
|         N    = total sample frequency.      |
|       These 2 models are simple MNL models. |
|       R-sqrd = 1 - LogL(model)/logL(other)  |
|       RsqAdj=1-[nJ/(nJ-nparm)]*(1-R-sqrd)   |
|         nJ   = sum over i, choice set sizes |
+---------------------------------------------+
+--------+-------------+----------------+--------+--------+
|Variable| Coefficient  | Standard Error |b/St.Er.|P[|Z|>z]|
+--------+-------------+----------------+--------+--------+
 WTR     |    1.02578262       .33651900     3.048   .0023
 MAR     |     .86848072       .22966062     3.782   .0002
 PRC     |    -.17342383       .03534842    -4.906   .0000
 BGW     |    -.54402062       .29009653    -1.875   .0608
 BEP     |     .01497590       .00229623     6.522   .0000
 ASC     |    1.22963483       .30990005     3.968   .0001
```

GP + EP + ASC:

Gender*Price Increase + Education*Price Increase + Alternative Specific Constant

```
+---------------------------------------------+
| Discrete choice and multinomial logit models|
+---------------------------------------------+
Normal exit from iterations. Exit status=0.
+---------------------------------------------+
| Discrete choice (multinomial logit) model   |
| Maximum Likelihood Estimates                |
| Model estimated: Jan 24, 2012 at 11:19:41PM.|
| Dependent variable               Choice     |
| Weighting variable                 None     |
| Number of observations              333     |
| Iterations completed                  5     |
| Log likelihood function       -321.2104     |
| Number of parameters                  6     |
| Info. Criterion: AIC =          1.96523     |
|   Finite Sample: AIC =          1.96600     |
| Info. Criterion: BIC =          2.03384     |
| Info. Criterion:HQIC =          1.99259     |
| R2=1-LogL/LogL*  Log-L fncn  R-sqrd  RsqAdj |
| Constants only    -354.7201  .09447  .08624 |
| Response data are given as ind. choice.     |
| Number of obs.=   333, skipped   0 bad obs. |
+---------------------------------------------+

+---------------------------------------------+
| Notes No coefficients=> P(i,j)=1/J(i).      |
|       Constants only => P(i,j) uses ASCs    |
|         only. N(j)/N if fixed choice set.   |
|         N(j) = total sample frequency for j |
|         N    = total sample frequency.      |
|       These 2 models are simple MNL models. |
|       R-sqrd = 1 - LogL(model)/logL(other)  |
|       RsqAdj=1-[nJ/(nJ-nparm)]*(1-R-sqrd)   |
|         nJ   = sum over i, choice set sizes |
+---------------------------------------------+
+--------+-------------+----------------+--------+--------+
|Variable| Coefficient  | Standard Error |b/St.Er.|P[|Z|>z]|
+--------+-------------+----------------+--------+--------+
 WTR     |     .60661257       .24763244     2.450   .0143
 MAR     |     .84960788       .22837245     3.720   .0002
 PRC     |    -.14666025       .03833522    -3.826   .0001
 BGP     |    -.03253262       .01796634    -1.811   .0702
 BEP     |     .01481857       .00230013     6.443   .0000
 ASC     |    1.21293944       .31022836     3.910   .0001
```

EP + FTRPRC + DLYPRC + ASC:

Education*Price Increase + Future Environmental Problems*Price Increase + Daily Spendings*Price Increase + Alternative Specific Constant

```
+--------------------------------------------+
| Discrete choice and multinomial logit models|
+--------------------------------------------+
Normal exit from iterations. Exit status=0.
+--------------------------------------------+
| Discrete choice (multinomial logit) model  |
| Maximum Likelihood Estimates               |
| Model estimated: Jan 24, 2012 at 11:20:20PM.|
| Dependent variable              Choice     |
| Weighting variable                None     |
| Number of observations             333     |
| Iterations completed                 5     |
| Log likelihood function       -317.8505    |
| Number of parameters                 7     |
| Info. Criterion: AIC =          1.95105    |
|   Finite Sample: AIC =          1.95209    |
| Info. Criterion: BIC =          2.03111    |
| Info. Criterion:HQIC =          1.98298    |
| R2=1-LogL/LogL*  Log-L fncn  R-sqrd  RsqAdj |
| Constants only    -354.7201  .10394  .09442 |
| Response data are given as ind. choice.    |
| Number of obs.=   333, skipped   0 bad obs. |
+--------------------------------------------+

+--------------------------------------------+
| Notes No coefficients=> P(i,j)=1/J(i).     |
|       Constants only => P(i,j) uses ASCs   |
|         only. N(j)/N if fixed choice set.  |
|         N(j) = total sample frequency for j |
|         N    = total sample frequency.     |
|       These 2 models are simple MNL models. |
|       R-sqrd = 1 - LogL(model)/logL(other)  |
|       RsqAdj=1-[nJ/(nJ-nparm)]*(1-R-sqrd)   |
|         nJ   = sum over i, choice set sizes |
+--------------------------------------------+
+--------+-------------+----------------+--------+--------+
|Variable| Coefficient  | Standard Error |b/St.Er.|P[|Z|>z]|
+--------+-------------+----------------+--------+--------+
 WTR     |     .60400524       .24926114     2.423   .0154
 MAR     |     .84127871       .23037696     3.652   .0003
 PRC     |    -.22740362       .04180910    -5.439   .0000
 BEP     |     .01457322       .00231727     6.289   .0000
 BFTRPRC |     .03835772       .01861285     2.061   .0393
 BDLYPRC |     .00102089       .00041372     2.468   .0136
 ASC     |    1.18729347       .31119176     3.815   .0001
```

EP + FTRPRC + DLYPRC + ORGPRC + ASC:

Education*Price Increase + Future Environmental Problems*Price Increase + Daily Spendings*Price Increase + Membership to Env. Organization*Price Increase + Alternative Specific Constant

```
+---------------------------------------------+
| Discrete choice and multinomial logit models|
+---------------------------------------------+
Normal exit from iterations. Exit status=0.
+---------------------------------------------+
| Discrete choice (multinomial logit) model   |
| Maximum Likelihood Estimates                |
| Model estimated: Jan 24, 2012 at 11:20:55PM.|
| Dependent variable               Choice     |
| Weighting variable                 None     |
| Number of observations              333     |
| Iterations completed                  7     |
| Log likelihood function       -309.7666     |
| Number of parameters                  8     |
| Info. Criterion: AIC =          1.90851     |
|   Finite Sample: AIC =          1.90984     |
| Info. Criterion: BIC =          2.00000     |
| Info. Criterion:HQIC =          1.94499     |
| R2=1-LogL/LogL*  Log-L fncn  R-sqrd  RsqAdj |
| Constants only    -354.7201  .12673  .11611 |
| Response data are given as ind. choice.     |
| Number of obs.=   333, skipped   0 bad obs. |
+---------------------------------------------+

+---------------------------------------------+
| Notes No coefficients=> P(i,j)=1/J(i).      |
|       Constants only => P(i,j) uses ASCs    |
|         only. N(j)/N if fixed choice set.   |
|         N(j) = total sample frequency for j |
|         N    = total sample frequency.      |
|       These 2 models are simple MNL models. |
|       R-sqrd = 1 - LogL(model)/logL(other)  |
|       RsqAdj=1-[nJ/(nJ-nparm)]*(1-R-sqrd)   |
|         nJ   = sum over i, choice set sizes |
+---------------------------------------------+
+--------+-------------+----------------+--------+--------+
|Variable| Coefficient  | Standard Error |b/St.Er.|P[|Z|>z]|
+--------+-------------+----------------+--------+--------+
 WTR     |     .57302943       .25303949     2.265   .0235
 MAR     |     .80102779       .23469065     3.413   .0006
 PRC     |    -.21054879       .04242153    -4.963   .0000
 BEP     |     .01279781       .00234285     5.463   .0000
 BFTRPRC |     .03436447       .01946920     1.765   .0776
 BDLYPRC |     .00092556       .00040950     2.260   .0238
 BORGPRC |     .18630768       .06457570     2.885   .0039
 ASC     |    1.11968428       .31589477     3.544   .0004
```

GW + IP + DLYPRC + ORGPRC + ASC:

Gender*Water Quality + IncomeTL*Price Increase + Daily Spendings*Price Increase + Membership to Env. Organization*Price Increase + Alternative Specific Constant

```
+---------------------------------------------+
| Discrete choice and multinomial logit models|
+---------------------------------------------+
Normal exit from iterations. Exit status=0.
+---------------------------------------------+
| Discrete choice (multinomial logit) model   |
| Maximum Likelihood Estimates                |
| Model estimated: Jan 24, 2012 at 11:21:23PM.|
| Dependent variable               Choice     |
| Weighting variable                 None     |
| Number of observations              333     |
| Iterations completed                  7     |
| Log likelihood function       -323.8100     |
| Number of parameters                  8     |
| Info. Criterion: AIC =          1.99285     |
|   Finite Sample: AIC =          1.99419     |
| Info. Criterion: BIC =          2.08434     |
| Info. Criterion:HQIC =          2.02933     |
| R2=1-LogL/LogL*  Log-L fncn  R-sqrd  RsqAdj |
| Constants only    -354.7201  .08714  .07604 |
| Response data are given as ind. choice.     |
| Number of obs.=   333, skipped   0 bad obs. |
+---------------------------------------------+

+---------------------------------------------+
| Notes No coefficients=> P(i,j)=1/J(i).      |
|       Constants only => P(i,j) uses ASCs    |
|         only. N(j)/N if fixed choice set.   |
|         N(j) = total sample frequency for j |
|         N    = total sample frequency.      |
|       These 2 models are simple MNL models. |
|       R-sqrd = 1 - LogL(model)/logL(other)  |
|       RsqAdj=1-[nJ/(nJ-nparm)]*(1-R-sqrd)   |
|         nJ   = sum over i, choice set sizes |
+---------------------------------------------+
+--------+-------------+----------------+--------+--------+
|Variable| Coefficient  | Standard Error |b/St.Er.|P[|Z|>z]|
+--------+-------------+----------------+--------+--------+
 WTR     |     .90901406       .33763021     2.692   .0071
 MAR     |     .74638117       .22984106     3.247   .0012
 PRC     |    -.05050779       .02398561    -2.106   .0352
 BGW     |    -.54390133       .28974637    -1.877   .0605
 BIP     |    .178388D-04    .970783D-05     1.838   .0661
 BDLYPRC |     .00089010       .00036631     2.430   .0151
 BORGPRC |     .21835081       .06321941     3.454   .0006
 ASC     |    1.18228810       .31069764     3.805   .0001
```

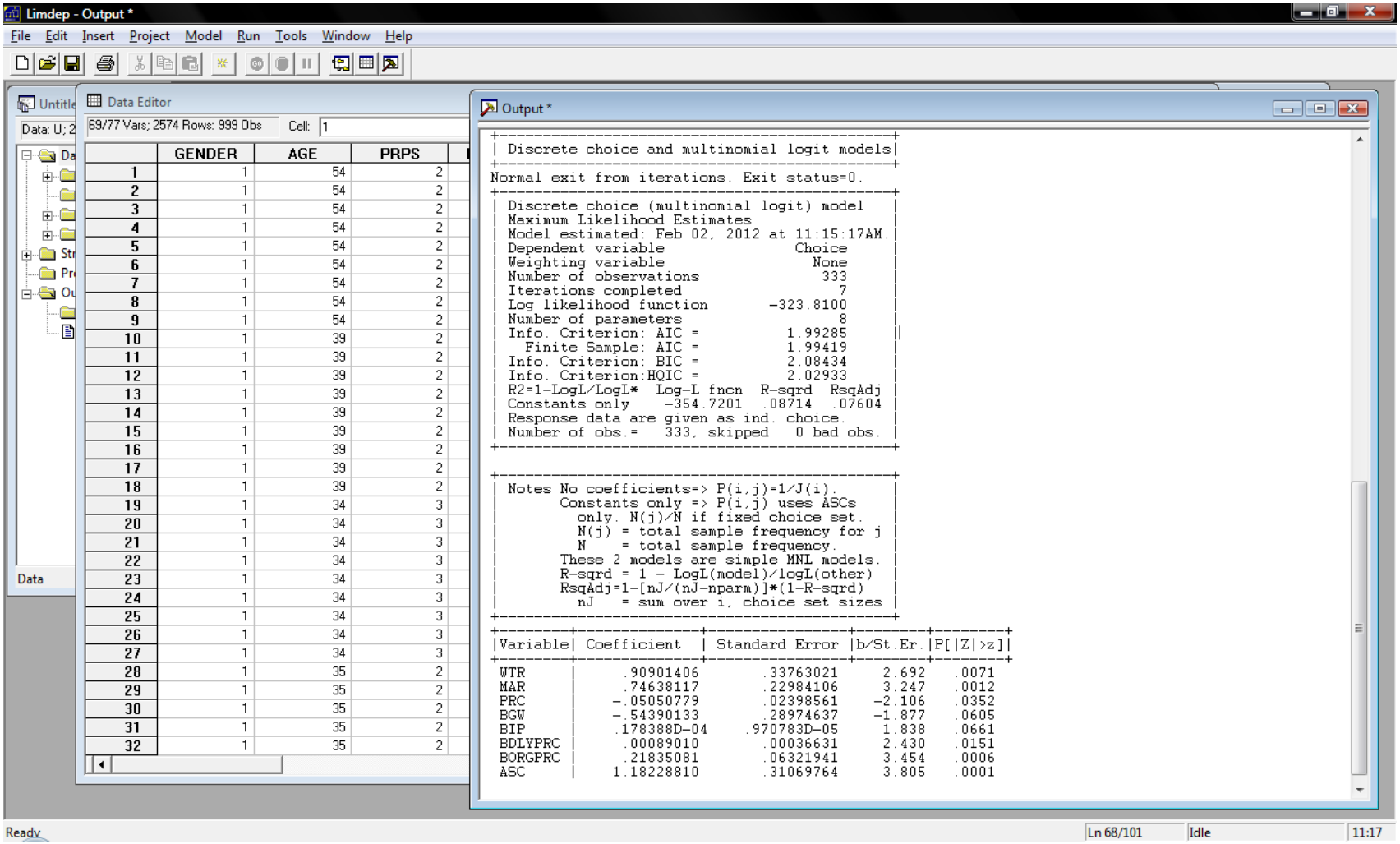
EP + ENVPRC + ASC:

Education*Price Increase + Environmental Problems*Price Increase + Alternative Specific Constant

```
+---------------------------------------------+
| Discrete choice and multinomial logit models|
+---------------------------------------------+
Normal exit from iterations. Exit status=0.
+---------------------------------------------+
| Discrete choice (multinomial logit) model   |
| Maximum Likelihood Estimates                |
| Model estimated: Jan 24, 2012 at 11:21:59PM.|
| Dependent variable               Choice     |
| Weighting variable                 None     |
| Number of observations              333     |
| Iterations completed                  5     |
| Log likelihood function       -320.2874     |
| Number of parameters                  6     |
| Info. Criterion: AIC =          1.95968     |
|   Finite Sample: AIC =          1.96046     |
| Info. Criterion: BIC =          2.02830     |
| Info. Criterion:HQIC =          1.98704     |
| R2=1-LogL/LogL*  Log-L fncn  R-sqrd  RsqAdj |
| Constants only    -354.7201  .09707  .08886 |
| Response data are given as ind. choice.     |
| Number of obs.=   333, skipped   0 bad obs. |
+---------------------------------------------+

+---------------------------------------------+
| Notes No coefficients=> P(i,j)=1/J(i).      |
|       Constants only => P(i,j) uses ASCs    |
|         only. N(j)/N if fixed choice set.   |
|         N(j) = total sample frequency for j |
|         N    = total sample frequency.      |
|       These 2 models are simple MNL models. |
|       R-sqrd = 1 - LogL(model)/logL(other)  |
|       RsqAdj=1-[nJ/(nJ-nparm)]*(1-R-sqrd)   |
|         nJ   = sum over i, choice set sizes |
+---------------------------------------------+
+--------+-------------+----------------+--------+--------+
|Variable| Coefficient  | Standard Error |b/St.Er.|P[|Z|>z]|
+--------+-------------+----------------+--------+--------+
 WTR     |     .60002116       .24714265     2.428   .0152
 MAR     |     .83438979       .22885952     3.646   .0003
 PRC     |    -.20525310       .03804626    -5.395   .0000
 BEP     |     .01516935       .00227228     6.676   .0000
 BENVPRC |     .03688033       .01635698     2.255   .0242
 ASC     |    1.21158500       .31097270     3.896   .0001
```

Screenshot from NLOGIT 4.0:



APPENDIX B

RESULTS FOR MNL RUNS – TOURISTS

AP + GW + ASC:

Age*Price Increase + Gender*Water Quality + Alternative Specific Constant

```
+--------------------------------------------+
| Discrete choice and multinomial logit models|
+--------------------------------------------+
Normal exit from iterations. Exit status=0.
+--------------------------------------------+
| Discrete choice (multinomial logit) model  |
| Maximum Likelihood Estimates               |
| Model estimated: Jan 24, 2012 at 11:24:37PM.|
| Dependent variable              Choice     |
| Weighting variable                None     |
| Number of observations             342     |
| Iterations completed                 4     |
| Log likelihood function       -357.9363    |
| Number of parameters                 6     |
| Info. Criterion: AIC =          2.12828    |
|   Finite Sample: AIC =          2.12902    |
| Info. Criterion: BIC =          2.19556    |
| Info. Criterion:HQIC =          2.15508    |
| R2=1-LogL/LogL*  Log-L fncn  R-sqrd  RsqAdj |
| Constants only    -374.4446  .04409  .03563 |
| Response data are given as ind. choice.    |
| Number of obs.=   342, skipped   0 bad obs. |
+--------------------------------------------+

+--------------------------------------------+
| Notes No coefficients=> P(i,j)=1/J(i).     |
|       Constants only => P(i,j) uses ASCs   |
|         only. N(j)/N if fixed choice set.  |
|         N(j) = total sample frequency for j |
|         N    = total sample frequency.     |
|       These 2 models are simple MNL models. |
|       R-sqrd = 1 - LogL(model)/logL(other)  |
|       RsqAdj=1-[nJ/(nJ-nparm)]*(1-R-sqrd)   |
|         nJ   = sum over i, choice set sizes |
+--------------------------------------------+
+--------+-------------+----------------+--------+--------+
|Variable| Coefficient  | Standard Error |b/St.Er.|P[|Z|>z]|
+--------+-------------+----------------+--------+--------+
 WTR     |    1.08073337       .27456736     3.936   .0001
 MAR     |     .72582123       .21025342     3.452   .0006
 PRC     |    -.06509628       .02902292    -2.243   .0249
 BAP     |     .00149144       .00051454     2.899   .0037
 BGW     |    -.44025526       .23900838    -1.842   .0655
 ASC     |    1.09713567       .29041576     3.778   .0002
```

AP + ASC:

Age*Price Increase + Alternative Specific Constant

```
+--------------------------------------------+
| Discrete choice and multinomial logit models|
+--------------------------------------------+
Normal exit from iterations. Exit status=0.
+--------------------------------------------+
| Discrete choice (multinomial logit) model  |
| Maximum Likelihood Estimates               |
| Model estimated: Jan 24, 2012 at 11:24:16PM.|
| Dependent variable              Choice     |
| Weighting variable                None     |
| Number of observations             342     |
| Iterations completed                 4     |
| Log likelihood function       -359.6355    |
| Number of parameters                 5     |
| Info. Criterion: AIC =          2.13237    |
|   Finite Sample: AIC =          2.13289    |
| Info. Criterion: BIC =          2.18844    |
| Info. Criterion:HQIC =          2.15471    |
| R2=1-LogL/LogL*  Log-L fncn  R-sqrd  RsqAdj |
| Constants only    -374.4446  .03955  .03248 |
| Response data are given as ind. choice.    |
| Number of obs.=   342, skipped   0 bad obs. |
+--------------------------------------------+

+--------------------------------------------+
| Notes No coefficients=> P(i,j)=1/J(i).     |
|       Constants only => P(i,j) uses ASCs   |
|         only. N(j)/N if fixed choice set.  |
|         N(j) = total sample frequency for j |
|         N    = total sample frequency.     |
|       These 2 models are simple MNL models. |
|       R-sqrd = 1 - LogL(model)/logL(other)  |
|       RsqAdj=1-[nJ/(nJ-nparm)]*(1-R-sqrd)   |
|         nJ   = sum over i, choice set sizes |
+--------------------------------------------+
+--------+-------------+----------------+--------+--------+
|Variable| Coefficient  | Standard Error |b/St.Er.|P[|Z|>z]|
+--------+-------------+----------------+--------+--------+
 WTR     |     .84399017       .24138709     3.496   .0005
 MAR     |     .75376876       .20908675     3.605   .0003
 PRC     |    -.06529688       .02893450    -2.257   .0240
 BAP     |     .00145264       .00051527     2.819   .0048
 ASC     |    1.10736583       .28938308     3.827   .0001
```

APPENDIX C
CHOICE EXPERIMENT SURVEY AND CHOICE CARDS USED

SURVEYOR NAME: _____

Survey No:	Date	Start Time	End Time	Total spent time
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				

Evaluating The Economic Value of Environmental Improvements in Göcek Bay by Stated Preference Method

Hello, I'm _____ .

First of all, I thank you in advance for your participation in this survey and sharing your thoughts .

In an ongoing master thesis in Middle East Technical University Environmental Engineering Department, evaluation of the economic value of environmental improvements in Göcek Bay is being studied. With the information and comments gathered from you, these improvements can be evaluated in terms of socio-economic effects.

This survey is not an official study run by the government, the data and results that will be gathered here will be used for scientific purposes and all your answers will be kept confidential.

1. Sex

	1	2	3	4	5	6	7	8	9	10
Female										
Male										

2. How old are you?

1		**6**	
2		**7**	
3		**8**	
4		**9**	
5		**10**	

3. Your purpose in being in Göcek?

	1	2	3	4	5	6	7	8	9	10
Tourism (skip Q4)										
I live here										
I'm here for some time because of my work (skip Q4)										

4. How long have you been living here?

1		**6**	
2		**7**	
3		**8**	
4		**9**	
5		**10**	

5. What's your occupation?

1	
2	
3	
4	
5	
6	
7	
8	
9	
10	

6. What's your marital status?

	1	2	3	4	5	6	7	8	9	10
Married										
Single										
Divorced/Widow										

7. Education status?

	1	2	3	4	5	6	7	8	9	10
Illiterate										
No diploma										
Elementary School										
Middle School										
High School										
University										
Master degree										
PhD.										

8. How much is your income?

1		**6**	
2		**7**	
3		**8**	
4		**9**	
5		**10**	

9. Do you own a boat that you use in Göcek?

	1	2	3	4	5	6	7	8	9	10
Yes										
No										

10. What's the type (wooden / fiber) and length of your boat that you use in Göcek?

1			**6**		
2			**7**		
3			**8**		
4			**9**		
5			**10**		

11. Have you ever been in Göcek before?

	1	2	3	4	5	6	7	8	9	10
Yes (go to Q12)										
No (go to Q13)										

12. How long have you been in Göcek, in which months?

1	
2	
3	
4	
5	
6	
7	
8	
9	
10	

13. <u>For local residents:</u> Apart from that you are living here ,what are our first three reasons to be here?
<u>For others:</u> Why did you choose Göcek, please put your first three reasons in order.

	1	2	3	4	5	6	7	8	9	10
The sea /nature is beautiful										
Service supply is good (restaurants, hostels, municipality services, electricity-water supply)										
Cheap										
Not crowded, I can rest well										
I can do fishing										
Other (please specify)										

1	6
2	7
3	8
4	9
5	10

14. What are the activities do you do most in Göcek, please put the first three choices in order.

	1	2	3	4	5	6	7	8	9	10
Yachting										
Swimming										
Sunbathing										
Walking/Running										
Water sports										
Fishing										
Attending tours										
Other (please specify)										

1	6
2	7
3	8
4	9
5	10

15. Which of the activities do you pay for that you do in Göcek ?

	1	2	3	4	5	6	7	8	9	10
Yachting										
Swimming										
Sunbathing										
Walking/Running										
Water sports										
Fishing										
Attending tours										
None										
Other (please specify)										

1	6
2	7
3	8
4	9
5	10

16. How much do you pay in average for attending tours/trips in Göcek?

17. How much do you pay in average for your daily spendings in Göcek?

1		
2		
3		
4		
5		

6		
7		
8		
9		
10		

18. How much do you pay in average as your water consumption cost?

(<u>locals:</u> water bill, <u>boat owners and captains:</u> marina fee, <u>tourists:</u> N/A)

19. <u>To boat owners and captains:</u> How much do you pay in average as marina/berthing rent?

1		
2		
3		
4		
5		

6		
7		
8		
9		
10		

20. <u>To boat owners and captains</u>: How long do you stay in marinas per year?

21. <u>To boat owners and captains</u>: How long do you stay and spend time in bays per year?

1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

22. If you own a boat, do you have a wastewater treatment unit in your boat?

	1	2	3	4	5	6	7	8	9	10
Yes (skip Q24)										
No										
No Answer (skip Q24)										

23. If you own a boat, do you have wastewater transfer equipments in your boat?

	1	2	3	4	5	6	7	8	9	10
Yes (skip Q25)										
No										
No Answer (skip Q25)										

24. In exchange of a fee, would you consider installing a wastewater treatment unit in your boat?

	1	2	3	4	5	6	7	8	9	10
Yes										
No										
No Answer										

25. In exchange of a fee, would you consider installing wastewater transfer equipments in your boat?

	1	2	3	4	5	6	7	8	9	10
Yes										
No										
No Answer										

26. How do you discharge the wastewater produced in your boat?

	1	2	3	4	5	6	7	8	9	10
Discharged into sea										
After storing, I give it to wastewater collection										
After storing, I give it to wastewater collection stations on the										

27. Do you think the number of wastewater collecting boats are enough?

	1	2	3	4	5	6	7	8	9	10
Yes										
No, should be										

28. Do you think the number of wastewater collection stations on land are enough?

	1	2	3	4	5	6	7	8	9	10
Yes										
No, should be										

29. Do you make a separation among your solid waste for recycling?

	1	2	3	4	5	6	7	8	9	10
Yes										
No										

30. How do you discharge the solid waste produced in your boat?

	1	2	3	4	5	6	7	8	9	10
I dump to sea										
After storing, I give it to solid waste collection boats										
After storing, I give it to solid waste collection stations on coast/land										

31. Do you think the number of solid waste collection boats are enough?

	1	2	3	4	5	6	7	8	9	10
Yes										
No, should be increased										

32. Do you think the number of solid waste collection stations on land are enough?

	1	2	3	4	5	6	7	8	9	10
Yes										
No, should be increased										

33. How do you tie your boat?

	1	2	3	4	5	6	7	8	9	10
I anchor where I found appropriate and tie it to a nearby place (trees, rocks etc.)										
I tie it to iron tying bars and buoys										

34. Do you think the number of iron tying bars and buoys are enough in Göcek?

	1	2	3	4	5	6	7	8	9	10
Yes										
No										
Not Sure										

35. Do you think there are environmental problems in Göcek?

	1	2	3	4	5	6	7	8	9	10
Yes										
No (skip Q38)										
I don't know (skip Q38)										

36. Do you think there might occur environmental problems in Göcek?

	1	2	3	4	5	6	7	8	9	10
Yes										
No (skip Q38)										
I don't know (skip Q38)										

37. Do you have a membership in an environmental organization? (NGO, foundations, etc.) (Turmepa, Greenpeace, WWF..)

	1	2	3	4	5	6	7	8	9	10
Yes										
No										

38. What do you think are the most important existent or possible environmental problems in Göcek, please put first three in order.

	1	2	3	4	5	6	7	8	9	10
Mixing of wastewater with sea										
Mixing of solid waste with sea										
Damaged seagrass, trees on land and other plants, the decrease in their population										
Decrease in population and variety of animals on sea and land										
Other (Please specify)										

1	6
2	7
3	8
4	9
5	10

39. Do you think environmental problems can be avoided via awareness increasing?

	1	2	3	4	5	6	7	8	9	10
Yes										
No (skip Q40)										
Not Sure (skip Q40)										

40. Which do you think would be the most effective awareness measure to improve the environmental conditions in Göcek ?

	1	2	3	4	5	6	7	8	9	10
Briefings that would be given to passengers on tour boats, before the trip										
Posters & flyers to the boats that will be staying in the marinas/sea										
A webpage on municipality's webpage about preventing pollution										
Other (Please specify)										

1	6
2	7
3	8
4	9
5	10

Göcek, being one of the most important bays in Turkey, has been declared a specially protected area by EPASA. But with the increasing popularity in tourism, environmental conditions and ecological quality might shift to an undesirable level due to pollution in and around Göcek Bay if boats **discharge their domestic wastewater and bilge waters** illegally to the sea. Solid waste on the surface of the sea and in the sea shows the human impact clearly. **Measurements in water quality** has showed a big increase in summer months in the harmful bacteria and in various chemical and physical parameters when compared to winter. This, without a doubt is harming human health and the ecosystem. Because of **anchoring in unsuitable places**, a kind of seagrass that is being protected by international agreements is seen to be getting unhealthy in west, compared to the east coast. Ecosystem on the coast is being damaged due to **tying the boats to trees and rocks instead of iron tying bars and buoys.**

The improvements that can be done to overcome these effects and to protect Göcek include: **increase in the number of wastewater and solid waste collection stations** to prevent sea pollution, decreasing the impacts of anchoring by **increasing the number of iron tying bars and buoys** to protect seagrasses and other sea creatures, better use of environment by **increasing awareness** and integrating **wastewater treatment systems** to boats to treat wasterwater.

Considering the improvements like these will protect Göcek without affecting the tourism and make Göcek a better place, can you please respond to the following questions?

41. (For boat owners and captains) You would need to pay an amount for the investments to increase the environmental conditions in Göcek. Would you be willing to pay this amount as an increase in your daily payments to marina services?

(For tourists) You would need to pay an amount for the investments to increase the environmental conditions in Göcek. Would you be willing to pay this amount as an increase in your payments for attending tours?

(For local residents) You would need to pay an amount for the investments to increase the environmental conditions in Göcek. Would you be willing to pay this amount as an increase in your monthly water bill amount?

	1	2	3	4	5	6	7	8	9	10
Yes (go to Q42)										
No (go to Q43)										

42. Why would you be willing to pay, put your first three reasons in order .

	1	2	3	4	5	6	7	8	9	10
We should leave a livable world to the future generations										
I will come here again, there shouldn't be any environmental problems										
Every creature in nature has a right to live										
I feel good contributing to environmental improvement										
Other (Please specify)										

1	6
2	7
3	8
4	9
5	10

43. Can you explain why you are not willing to pay?

	1	2	3	4	5	6	7	8	9	10
No need for an										
Polluters should pay, I'm not responsible										
Government/municipality should handle this										
I don't think my money will reach to the right place										
I cannot afford										
Other (Please specify)										

1	6
2	7
3	8
4	9
5	10

44. Considering your yearly income and spendings, which of the scenarios would you choose?

	Scenario 1	Scenario 2	Scenario 3
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

FOR LOCAL RESIDENTS & TOURISTS

A	Scenario 1	Scenario 2	Scenario 3
Water quality levels (biological, chemical)	Water quality level that would not threat human health and that would not hinder swimming and water sports activities	Water quality level that would threat human health & marine life and that would hinder swimming and water sports activities	Water quality level that would threat human health & marine life and that would hinder swimming and water sports activities
Marine Life (Physical)	Protecting the necessary habitat to be able to maintain a healthy marine life	Protecting the necessary habitat to be able to maintain a healthy marine life	The risk of habitat loss for marine creatures
Amount to be paid (increase)	10 TL	5 TL	0 TL

FOR LOCAL RESIDENTS & TOURISTS

B	Scenario 1	Scenario 2	Scenario 3
Water quality levels (biological, chemical)	Water quality level that would not threat human health and that would not hinder swimming and water sports activities	Water quality level that would threat human health & marine life and that would hinder swimming and water sports activities	Water quality level that would threat human health & marine life and that would hinder swimming and water sports activities
Marine Life (Physical)	The risk of habitat loss for marine creatures	Protecting the necessary habitat to be able to maintain a healthy marine life	The risk of habitat loss for marine creatures
Amount to be paid (increase)	20 TL	15 TL	0 TL

FOR LOCAL RESIDENTS & TOURISTS

C	Scenario 1	Scenario 2	Scenario 3
Water quality levels (biological, chemical)	Water quality level that would not threat human health and that would not hinder swimming and water sports activities	Water quality level that would not threat human health and that would not hinder swimming and water sports activities	Water quality level that would threat human health & marine life and that would hinder swimming and water sports activities
Marine Life (Physical)	Protecting the necessary habitat to be able to maintain a healthy marine life	The risk of habitat loss for marine creatures	The risk of habitat loss for marine creatures
Amount to be paid (increase)	15 TL	10 TL	0 TL

FOR LOCAL RESIDENTS & TOURISTS

D	Scenario 1	Scenario 2	Scenario 3
Water quality levels (biological, chemical)	Water quality level that would not threat human health and that would not hinder swimming and water sports activities	Water quality level that would not threat human health and that would not hinder swimming and water sports activities	Water quality level that would threat human health & marine life and that would hinder swimming and water sports activities
Marine Life (Physical)	Protecting the necessary habitat to be able to maintain a healthy marine life	The risk of habitat loss for marine creatures	The risk of habitat loss for marine creatures
Amount to be paid (increase)	20 TL	5 TL	0 TL

FOR LOCAL RESIDENTS & TOURISTS

E	Scenario 1	Scenario 2	Scenario 3
Water quality levels (biological, chemical)	Water quality level that would threat human health & marine life and that would hinder swimming and water sports activities	Water quality level that would not threat human health and that would not hinder swimming and water sports activities	Water quality level that would threat human health & marine life and that would hinder swimming and water sports activities
Marine Life (Physical)	Protecting the necessary habitat to be able to maintain a healthy marine life	The risk of habitat loss for marine creatures	The risk of habitat loss for marine creatures
Amount to be paid (increase)	15 TL	20 TL	0 TL

FOR LOCAL RESIDENTS & TOURISTS

F	Scenario 1	Scenario 2	Scenario 3
Water quality levels (biological, chemical)	Water quality level that would not threat human health and that would not hinder swimming and water sports activities	Water quality level that would not threat human health and that would not hinder swimming and water sports activities	Water quality level that would threat human health & marine life and that would hinder swimming and water sports activities
Marine Life (Physical)	The risk of habitat loss for marine creatures	Protecting the necessary habitat to be able to maintain a healthy marine life	The risk of habitat loss for marine creatures
Amount to be paid (increase)	15 TL	20 TL	0 TL

FOR LOCAL RESIDENTS & TOURISTS

G	Scenario 1	Scenario 2	Scenario 3
Water quality levels (biological, chemical)	Water quality level that would threat human health & marine life and that would hinder swimming and water sports activities	Water quality level that would not threat human health and that would not hinder swimming and water sports activities	Water quality level that would threat human health & marine life and that would hinder swimming and water sports activities
Marine Life (Physical)	Protecting the necessary habitat to be able to maintain a healthy marine life	Protecting the necessary habitat to be able to maintain a healthy marine life	The risk of habitat loss for marine creatures
Amount to be paid (increase)	10 TL	20 TL	0 TL

FOR LOCAL RESIDENTS & TOURISTS

H	Scenario 1	Scenario 2	Scenario 3
Water quality levels (biological, chemical)	Water quality level that would threat human health & marine life and that would hinder swimming and water sports activities	Water quality level that would not threat human health and that would not hinder swimming and water sports activities	Water quality level that would threat human health & marine life and that would hinder swimming and water sports activities
Marine Life (Physical)	Protecting the necessary habitat to be able to maintain a healthy marine life	The risk of habitat loss for marine creatures	The risk of habitat loss for marine creatures
Amount to be paid (increase)	5 TL	15 TL	0 TL

FOR LOCAL RESIDENTS & TOURISTS

I	Scenario 1	Scenario 2	Scenario 3
Water quality levels (biological, chemical)	Water quality level that would threat human health & marine life and that would hinder swimming and water sports activities	Water quality level that would not threat human health and that would not hinder swimming and water sports activities	Water quality level that would threat human health & marine life and that would hinder swimming and water sports activities
Marine Life (Physical)	Protecting the necessary habitat to be able to maintain a healthy marine life	The risk of habitat loss for marine creatures	The risk of habitat loss for marine creatures
Amount to be paid (increase)	15 TL	15 TL	0 TL

FOR LOCAL RESIDENTS & TOURISTS

J	Scenario 1	Scenario 2	Scenario 3
Water quality levels (biological, chemical)	Water quality level that would threat human health & marine life and that would hinder swimming and water sports activities	Water quality level that would not threat human health and that would not hinder swimming and water sports activities	Water quality level that would threat human health & marine life and that would hinder swimming and water sports activities
Marine Life (Physical)	Protecting the necessary habitat to be able to maintain a healthy marine life	The risk of habitat loss for marine creatures	The risk of habitat loss for marine creatures
Amount to be payed (increase)	20 TL	15 TL	0 TL